MIT-ADT UNIVERSITY
PUNE, INDIA

Design Thinking

SEMESTER II PROJECT REPORT

B. Tech (CS, IT)
Session 2023-24

Consolidated submission for showcasing Application of Design Thinking Tools and Techniques for solving real life problems.
File contains research data and documentation of methodology and process of research while generating solution for selected topics.

Guided by
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Report/ Documentation

On

Anti Parking:
Smart Detection of Illegal Parking.

Submitted for the evaluation and assessment in subject Design Thinking
As partial fulfilment of the Undergraduate course

Submitted to
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Table of Content

1.Introduction

Figure 1:https://www.hindustantimes.com/delhi-news/in-delhi-pedestrians-forced-to-walk-on-roads-as-pavements-turn-into-parking-lots/story-V2F3c6DChYJnAURFOAA0bI.html

In India, many cars are parked in the wrong places, causing problems for people and traffic. This study looks at these problems and suggests ways to improve the situation.

Wrongly parked cars can make it hard for people to walk, make it difficult for emergency vehicles to get through, and slow down traffic. There are not enough parking spaces in many areas, which makes the problem worse.

To solve this problem, we suggest using technology and infrastructure together to enforce parking rules. We propose to install smart signs that can detect and report any cars parked in the wrong place to the authorities. These signs will remind drivers not to park in the wrong places and give the authorities real-time information about parking violations.

By solving the problem of wrongly parked cars, we can make roads safer, reduce traffic jams, and improve life in crowded areas. This study will examine the problem in detail and evaluate our suggested solution, showing its benefits and limitations.

2.Purpose:

Fig 2: No parking violation

With latest news about our country having the second highest population in the world. It is a record that is the cause to various problems in the country, like **accidents, inadequate parking space, increased number of private vehicles, illegal parking,** etc. There have been many attempts to try and solve these problems. This research is based on providing a solid solution for solving the problem of anti-parking. From the research conducted, we can conclude that illegal parking leads to more severe problems, which is mostly fights over parking. In some cases, people are parking in front of houses, and sometimes it results in blocking of roads. This is especially observed in commercial areas, and housing societies.

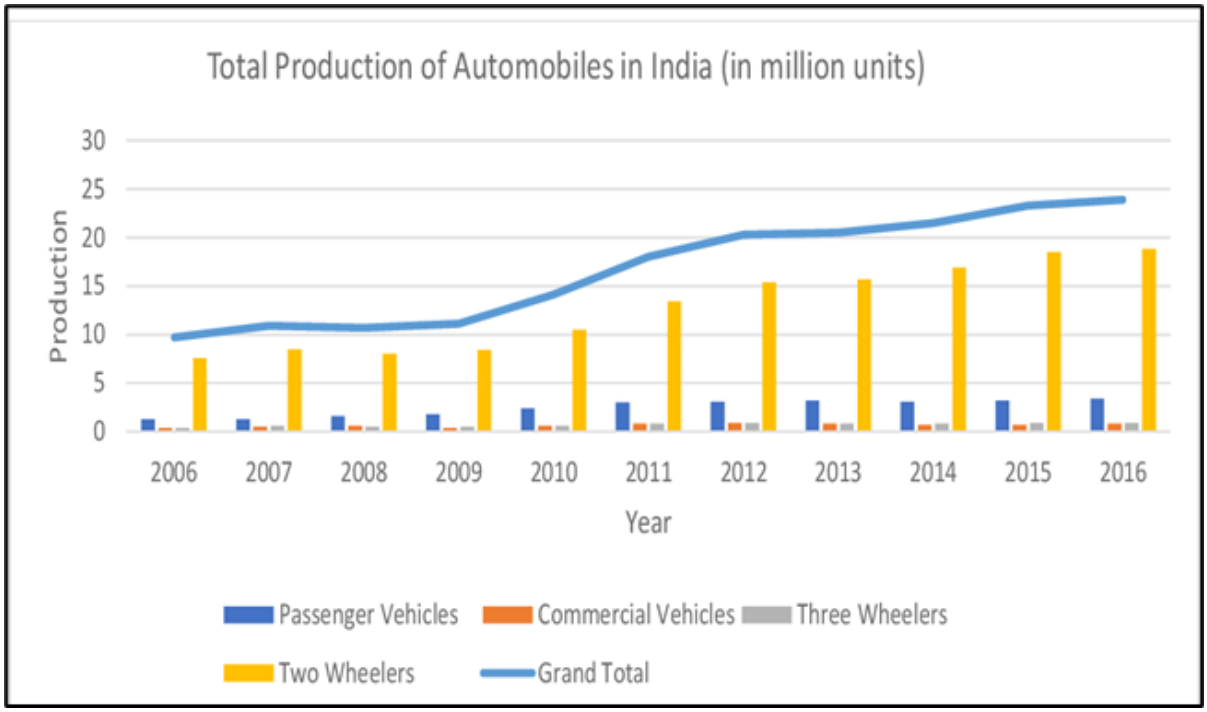
Fig 3: Illegal parking in commercial areas

India, a country of **1.3 billion** people and a fast-expanding economy, is seeing an exponential rise in the number of cars on the road, which due to lack of proper planning and infrastructure is causing traffic jams, illegal parking. The goal of this study is to analyse the parking issue as it exists today, taking several factors in mind such as geographic restrictions, car density, and population increment. Through these difficulties, the study intends to provide a thorough parking plan that would address the problems encountered by the public and commercial sectors, and allowing a traffic flow and improving India's urban living conditions.

The most important point is that it is causing a lot of disturbance in the society, by causing people to fight. This has even led to various severe injuries and deaths. Eventually it is the innocent people that are facing most of the adverse effects. **Our project is based on trying to resolve this problem in-order to bring discipline, peace to the community. This idea will also help resolve traffic congestions.**

3. Problem Statement:

Problem Study:



In the current times it is very evident that as science and technology are continually advancing the death rate in the world is also reducing, but on the other hand this is causing problems related to overpopulation especially in India. This leads us to one of the main Problems that is faced by all citizens of the country, and that is 'Anti Parking'. Here are a few root causes of the problem. Whether it is a hospital, mall, school, college, residential areas or an office they all experience the same problem which is resulting in complete waste of time and efforts. This brings us to the first point, i.e. a rapid increase in number of vehicles. This sudden increase in number of vehicles has put an extreme amount of pressure on the availability of parking space, which mostly results in unnecessary congestion in the urban areas of the city. The second point that also contributed to the problem is the 'Lack of Proper Planning', this has played a major role as it also affects the business activity of that region. Along with this the absence of penalties for illegal parking which results in violation of the parking rules. This problem continues to escalate due to increase in urbanization.

Problem Analysis:

Outcomes of the problem:

● **Increased street fights:** This caused by illegal parking in commercial, residential and office areas, which often lead to fights and injuries in the process.

● **Increased rate of accidents:** This is caused by vehicles parked in illegal parking due to lack of parking space.

● **Congestion of Traffic:** This is mostly caused due to illegal parking and lack of parking space in various housing societies, offices, school & hospital complexes.

Problem Statement:

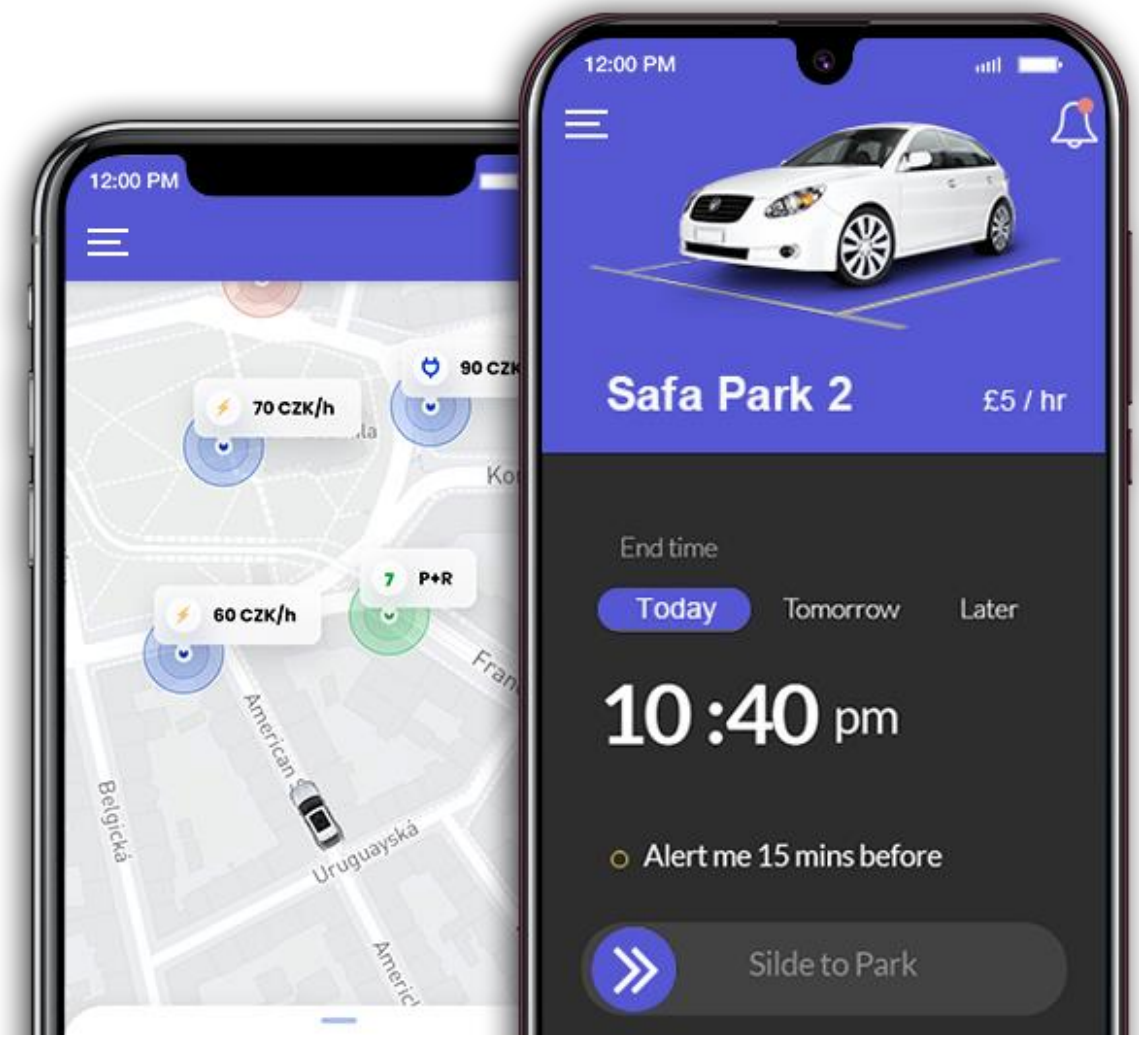
Parking is becoming a very common problem, but specifically it has become a major issue when it comes to **Illegal Parking or Anti Parking.** There are many places in urban cities which face traffic congestion, accidents, street fights and towing away of vehicles because of the failure to adhere to the parking rules in central points of a city.

4. Secondary Data

4.1 Research Papers

A. Title: Detection and Identification of Vehicle's No-Parking Area using IoT and Cloud

Journal: By Vaibhav B. Mandlik, Vaishnavi M. Kulkarni, Aakash L. Rathod, Kalyani H. Dhake



Reference: https://www.matellio.co.uk/on-demand-parking-assistance-mobile-application/

Summary: The working of the system for this research is as follows. After using a sensor to find out the geolocation of the vehicle, after which it is sent to the server for processing. This part will take place only when the device senses that the vehicle has stopped moving. The server compares the last location with the existing locations stored on the cloud database and it sends a response to the device. If the server responds with a positive message. Then the device will send a request message to the server asking for the geolocation of that area. After the server sends the information to the device. It will be sent to the user. If the response is negative then the device will send an alert through the mobile application, alerting the user that the parked vehicle

Outcome:

- System tracks vehicle location using a sensor.
- When the vehicle stops, location data is sent to a server.
- Server checks if the location is authorized (compared to stored data).
- If authorized:
    - System can send location information to the user upon request.
- If unauthorized:
    - System sends an alert to the user's phone app.

B. Title: AN AUTOMATIC NO PARKING VEHICLE NOTIFICATION SYSTEM USING IOT

Journal: DR. D. Kavitha, Bharath Kumar G, Bharath Kumar V, Jogesh Kumar E R

Reference: https://www.shutterstock.com/search/automatic-number-plate-recognition

Summary: The working method for this research is as follows. The number plate is detected by using CCTV cameras fixed on the roads. Whenever a vehicle is parked in the prohibited area, the CCTV camera will detect it and it can notify the traffic department. This comes with a wide variety of applications such as, the expressway toll collection, over speeding violations, etc. In this method **convolution neural networks (CNN)** are used for number plate detection. Going ahead with this proposal can be very complicated, as there are difficulties like, camera may get rotated accidently, also detecting multi-directional car licence plate like the view point variation of hand-held cameras. The performance level of this idea mainly depends on the traffic object detector, use of a robust detector will definitely make it more dependable.

Outcome:

- **Benefits:**
  - Can automatically detect vehicles parked in prohibited areas using CCTV cameras with license plate recognition.
  - Offers a variety of applications like toll collection and speeding violation detection.
- **Challenges:**
  - Difficulty in handling unexpected camera rotations.
  - Challenges in detecting license plates from various angles (like those captured from handheld cameras).
- **Success depends on:**
  - Using a reliable traffic object detector to improve overall system performance.

C. Title: An Analysis of the Effect of Non-Parking Facilities in Parking-Only Buildings on the Traffic Inducement Rate

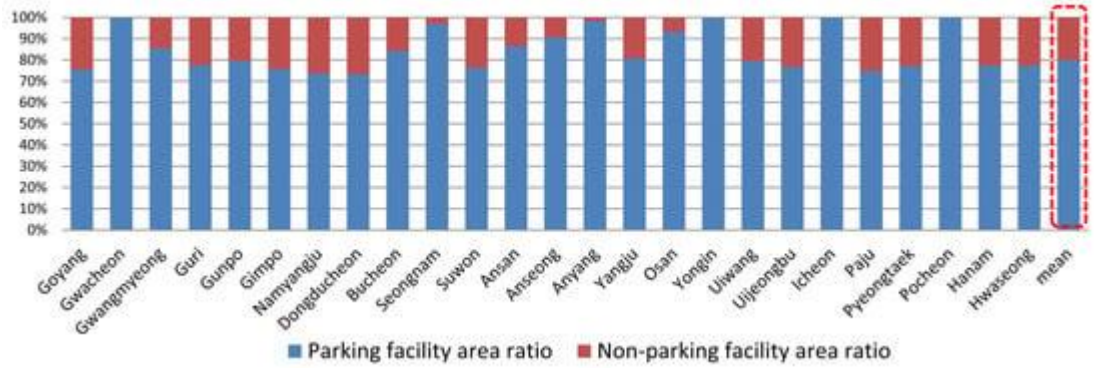


Figure 4:https://www.mdpi.com/2071-1050/14/7/4250?type=check_update&version=1

Journal: DR. D. Kavitha, Bharath Kumar G, Bharath Kumar V, Jogesh Kumar E R

Summary: The study's focus on examining the use of non-parking facilities (NPFs) in parking-only buildings (POBs) in Gyeonggi-do, South Korea, is summarized in the introduction. It highlights the significance of resolving issues related to NPF use in POBs and provides an overview of the history, purpose, and study topic. It also talks about how important the study is for guiding decisions on urban development and traffic management.

In order to offer insights for traffic management policy, this study looks at how non-parking facilities (NPFs) are used in parking-only buildings (POBs) in Gyeonggi-do, Republic of Korea. Off-street parking lots known as POBs have a sizable amount of their floor space set out for parking. NPFs' inclusion in POBs, however, raises questions about how to strike a balance between parking availability and commercial use. Although POBs have the ability to provide sophisticated services and enhance land use efficiency, they also face obstacles such parking facilities being converted into NPF storage areas. The study looks into many viewpoints on POBs, such as those of academics, researchers, governmental officials, and owners of private businesses.

Keywords: Parking-only buildings, Non-parking facilities, Traffic management, Urban planning, Policy implications, Gyeonggi-do, South Korea.

Outcome:

- **Problem:** There's a conflict between having enough parking spaces and allowing for additional uses like shops and cafes (NPFs) within parking structures (POBs).
    - Including NPFs might lead to converting parking spaces for storage by these businesses, reducing available parking.
- **Approach:** The study examines how NPFs are currently used in POBs to understand the impact on parking availability.
    - This will help develop insights for traffic management policies.
    - By considering various viewpoints (academics, government, businesses), the study aims to inform decisions on urban development and planning for a better balance between parking needs and potential benefits of NPFs.

Research Article

A. Title: Car Parking- A Perennial Problem of Kolkata

Journal by Pinky Rome, Sayantani Mukherjee

Figure 5:https://www.researchgate.net/publication/327673471_Car_Parking-_A_Pernnial_Problem_of_Kolkata

Summary: Because of its popularity with tourists, Kolkata, the capital of West Bengal, has problems with its parking management system. To address this issue, the city requires the government and non-governmental organisations to step in quickly. In spite of this, Kolkata has the capacity to lead the nation if it embraces creative ideas and builds on its advantages, which include a network of zero-emission trams, a vast public transportation system, and pedestrian-friendly architecture. Congestion is made worse in strategic locations such as shopping centres and well-liked restaurants, where crowds of people come from all around the city. Even though the Kolkata Municipal Corporation has worked to establish on-street parking spaces, more all-encompassing solutions are required to reduce traffic and guarantee effective parking management in the city.

Links:

B. Title: Illegal parking: House gates, slip roads not spared too.

By Deepak Yadav

Summary: In Chandigarh there are many cars and motorcycles that are utilised by the citizens of the city. Due to parking fees charged at various landmarks, the people prefer to park on footpaths, open areas, slip roads, empty roads and even houses. This has become a frequent practice in various parts of the city. It results in a large amount of inconvenience to all citizens who frequently travel through the streets. In sectors near the main market and commercial areas, people do not mind parking in front of houses sometimes blocking the main gate also.

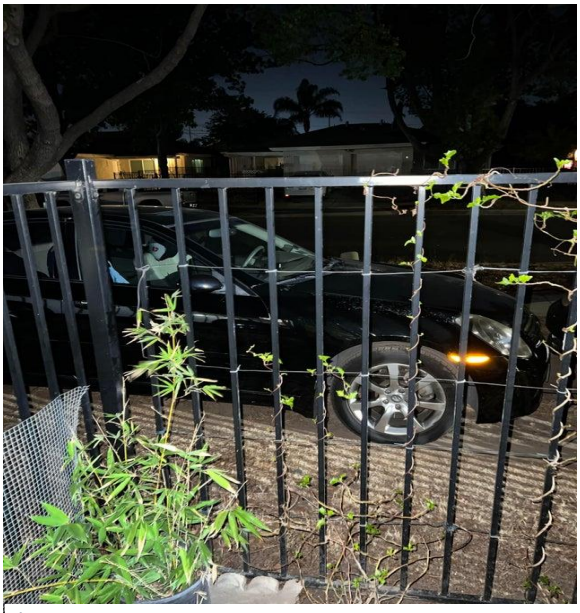


Figure 6:https://www.thesun.co.uk/motors/19926468/neighbours-

C. Title: Delhi parking wars intensify, over 7,000 calls to police this year

By Sanjeev K Jha

Summary: This year the police registered 7328 calls reporting violent disputes over parking on neighbourhood roads. According to the data, the police reported 3,367 and 2,413 parking disputes related calls in 2022 and 2021. Besides these records they reported numerous accounts when people were injured due to the clashes over parking space.

On February 17, 2023, a 52-year-old man and his son were returning from an occasion, they were found shot and injured by their neighbour and his friends following an argument over parking of their cars in north-east Delhi.

On June 25, two brothers were allegedly stabbed by their neighbour in north Delhi's Kirari area after an argument over parking a scooter.

Likewise, on July 3, a 37-year-old man along with his parents were allegedly thrashed with sticks by their neighbours during a dispute over parking of a motorcycle, similarly in outer Delhi.

Links: Article 1: https://www.hindustantimes.com/cities/delhi-news/delhi-parking-wars-intensify-over-7-000-calls-to-police-this-year-101698514000997.html

Article 2:https://timesofindia.indiatimes.com/city/chandigarh/illegal-parking-house-gates-slip-roads-not-spared-too/articleshow/102154222.cms

D. Title: The impacts of illegal parking on the urban areas' traffic and environmental conditions: The case of the city of Thessaloniki.

By Anastasios Tsakalidis, Panagiotis Tsoleridis

Summary: Many Greek cities have experienced an illegal parking phenomenon due to several factors, including low-quality, unattractive public transportation, a lack of parking facilities, inadequate driver education, and inadequate policing. These factors have contributed to the aesthetic and cultural degradation of these cities and rendered them inaccessible to both vehicles and pedestrians. In this study, Thessaloniki, Greece's city's illegal parking issue is examined along a few chosen road axes. The effect of unlawful parking on the decrease in road capacity was computed following the proper processing of the data gathered. Furthermore, an attempt was made to link the kinds of nearby land use with unlawful parking activities. Conclusions are drawn about the severity of parking infractions and the reduction in road capacity in connection to the features of the road and nearby land uses, and potential solutions are put up in the form of policies and procedures.

E. Title: Study on demand and characteristics of parking system in urban areas: A review

By Janak Parmar, Pritikana Das, Sanjaykumar M. Dave

Summary: Many Greek cities have experienced an illegal parking phenomenon due to several factors, including low-quality, unattractive public transportation, a lack of parking facilities, inadequate driver education, and inadequate policing. These factors have contributed to the aesthetic and cultural degradation of these cities and rendered them inaccessible to both vehicles and pedestrians. In this study, Thessaloniki, Greece's city's illegal parking issue is examined along a few chosen road axes. The effect of unlawful parking on the decrease in road capacity was computed following the proper processing of the data gathered. Furthermore, an attempt was made to link the kinds of nearby land use with unlawful parking activities. Conclusions are drawn about the severity of parking infractions and the reduction in road capacity in connection to the features of the road and nearby land uses, and potential solutions are put up in the form of policies and procedures.

Blogs

A. Title: Issues with Parking in Indian Metropolises

Journal by Shubhankar Gautam

Figure 7:Issues-and-Challenges-of-Parking-in-Indian-Metropolises-by-Avnika-Nagar[1].pdf

Summary: Increased demand for parking spaces as a result of fast urbanisation and changes to metropolitan infrastructure has led to a mismatch between supply and demand, traffic jams, accidents, and environmental risks. In Indian cities like Delhi, Mumbai, and Kolkata, the parking industry frequently encounters challenges like overcrowding in parking lots, criminal activity, and uncontrolled parking near establishments like ATMs, banks, snack shops, and newspapers. Parking is a problem for specialised organisations like churches, schools, and hospitals as well, which causes traffic jams, conflicts, and time waste.

Cities like Delhi, Kolkata, and Mumbai are plagued by the overabundance of vehicles occupying parking places, which clogs the roads. About 10% of Delhi's land is used for parking, and violent incidents have been reported there.

Case study : Parking issues on FC Road, Pune

Pune city has terrible traffic issues due to citizens disobeying traffic rules, FC Road being a busy street faces this issue mainly due to illegal and double lane parking of two wheelers. Double parking of two wheelers on both sides of the road takes up lane space and therefore less space is left for vehicles to pass. Illegal four-wheeler parking is also an issue on FC Road. Cars and bikes are mainly parked illegally in front of famous local restaurants like Vaishali, Roopali, Wadeshwar and a few pizza joints. High end luxury and sports cars are a common sight on FC Road and are also illegally parked on the side of the road and police do not seem to take any action as the cars are owned by restaurant and store owners. It has been noticed by the public that traffic policemen in tow trucks mostly target students who are soft targets and ignore cars that are parked outside prominent hotels. Residents staying on FC Road face noise pollution every day and this is a serious problem at night when there is constant honking on the road due to traffic and residents are unable to sleep. The traffic issue on FC Road is very serious as FC Road connects to the top hospitals in the city and ambulances getting stuck in traffic is not optimal.

Case study: Parking issue Katraj Pune

Popular gardens in Pune like Saras Baug, Vartak Garden, and Rajeev Gandhi Zoological Park are grappling with various issues, notably encroachment by hawkers and parking mismanagement. Despite being iconic attractions, these gardens face challenges exacerbated by increasing footfall, particularly during festivals and weekends. Saras Baug, known for its significance among tourists and devotees of Lord Ganesh, attracts around

10,000 visitors monthly, with numbers surging during vacations and festivities. However, the surge in visitors strains the already insufficient parking facilities, worsened by PMC's mismanagement and encroachment. Similarly, Vartak Garden, a favorite spot among senior citizens, experiences parking woes, often aggravated by vehicles obstructing the garden gate, further compounded by ongoing metro foot-overbridge construction nearby. Despite the outcry from visitors, the administration claims ignorance, citing no formal complaints, highlighting a disconnect between public grievances and administrative responsiveness. The situation underscores the need for proactive measures to address parking infrastructure inadequacies and curb encroachment, ensuring the continued enjoyment of these beloved public spaces by residents and tourists alike.

Secondary Data Outcomes:

Common Problems:

- Lack of Parking Infrastructure
- Traffic Congestion
- Pedestrian Safety
- Conflict and Violence
- Environmental Impact

Underlying Causes:

- Inadequate Enforcement
- Poor Urban Planning
- Unattractive Public Transportation

Impacts:

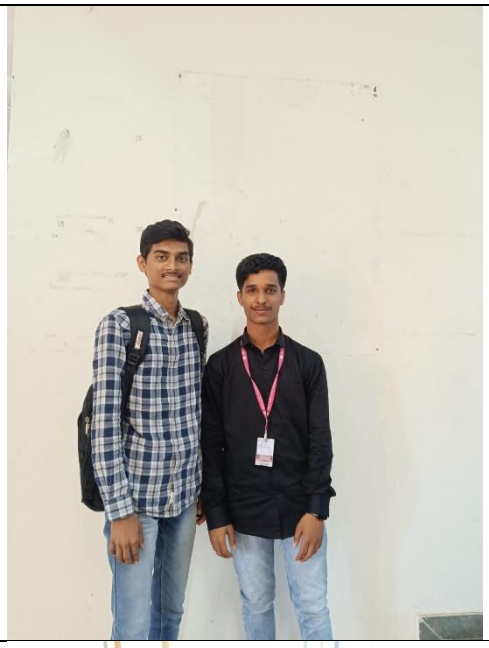
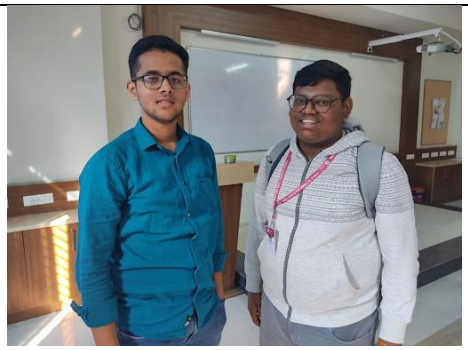
- Reduced Traffic Flow
- Economic Costs
- Decreased Quality of Life

Potential Solutions:

- Increased Parking Infrastructure
- Improved Public Transportation
- Stricter Enforcement
- Smart Parking Technologies

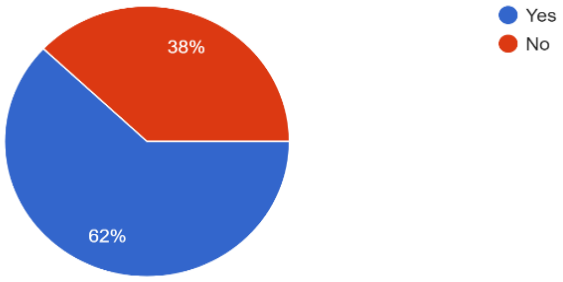
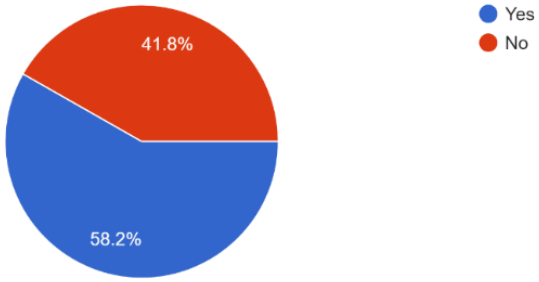
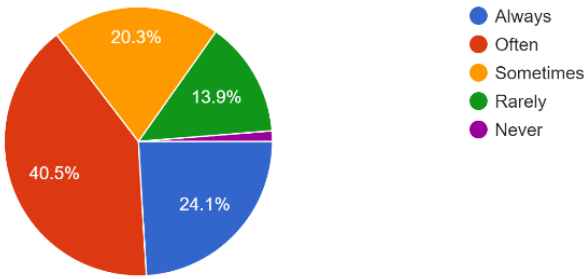
Interviews:

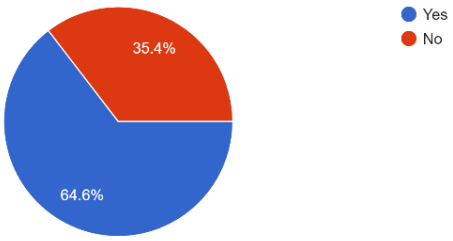
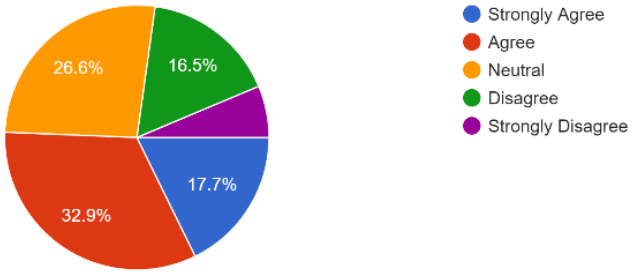
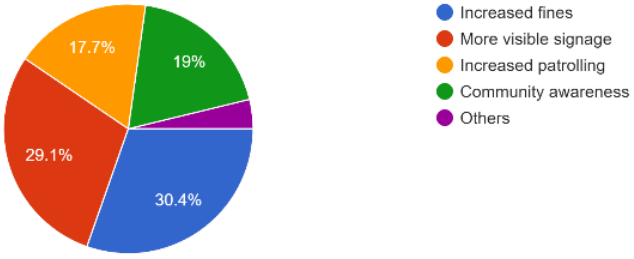
Sl.	Interviewee	Interview Question (Essential for research outcomes)	Inferences
1		Can you describe any recent experiences you've had related to parking issues in your area? How often do you encounter problems finding legal parking spaces? What challenges or inconveniences have you faced due to illegal parking in your locality?	Illegal parking causes traffic problems and makes it hard for everyone to find legal spots. It can lead to jams and inconvenience for everyone in the area.
2		Do you think there are enough parking facilities available in your city/town? In your opinion, what are the main reasons people park in no parking zones?	Limited parking spaces lead to illegal parking, often due to urgency or lack of available spots. This can create safety hazards like visibility issues and potential accidents.
3		Do you find hard to park your vehicle whenever you are out? What do you think does parking vehicles in city areas causes traffic? Do you think no parking problem is the major issue nowadays?	Parking issues in city areas, especially no parking problems, cause significant traffic congestion. This can lead to inconvenience during emergencies and even result in vehicles being towed and fines being issued.amount of security.

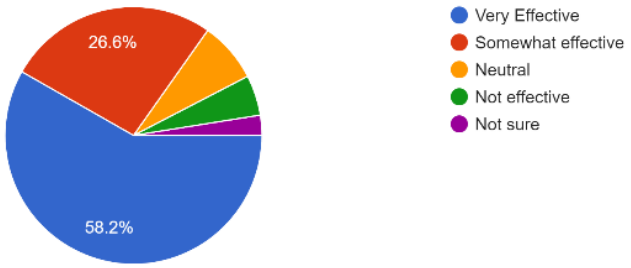
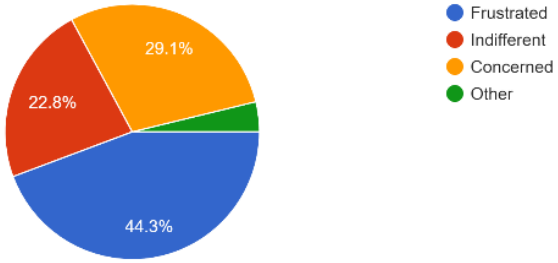
Sl.	Interviewee	Interview Question (Essential for research outcomes)	Inferences
4		What are the main challenges you face due to the lack of parking spaces in India? Have you experienced any inconveniences or conflicts related to parking in your neighborhood? How do you think the lack of parking infrastructure affects daily life and mobility in Indian cities?	Illegal Parking in metropolitan areas of a city causes a havoc and disturbs the free-flowing nature of the traffic
5		Can you describe any recent experiences you've had related to parking issues in your area? What challenges or inconveniences have you faced due to illegal parking in your locality?	Promoting awareness about laws can greatly benefit society by educating individuals about their rights and responsibilities
6		What challenges or inconveniences have you faced due to illegal parking in your locality? Can you describe any recent experiences you've had related to parking issues in your area?	He is conscientious about parking regulations, avoiding fines by checking restrictions. They recently experienced difficulty finding parking due to illegal parking in their neighborhood, causing frustration. Illegal parking poses safety hazards and inconvenience, especially on sidewalks.

Sl.	Interviewee	Interview Question (Essential for research outcomes)	Inferences
7		Are there any innovative solutions or practices from other countries that you think could be applied to address parking issues in India? How do you think the government and local authorities should tackle the parking problem? Have you noticed any specific areas or types of establishments where parking issues are particularly severe?	Common people rely on the government to take strict measures to solve this problem and hence help the masses.
8		Are you aware of the regulations regarding no parking zones in your locality? Have you faced any inconveniences or safety hazards due to vehicles parked in no parking zones? What was the feeling when your vehicle was taken away?	Parking in no parking zones contributes significantly to traffic issues, and it's common for people to inadvertently or knowingly park in such areas. This can lead to inconveniences like vehicles being towed, causing stress and wasting time.
9		Do you think no parking problem is the major issue nowadays? have you ever faced the problem of parking your vehicle in an emergency case? Does an RTO department gives us the fine for parking vehicle and no parking or in major cases is it they file the case?	Parking problems during emergencies are significant, and there should be a dedicated system to address the no parking issue. Sometimes, in emergencies, finding a parking spot can be a challenge, leading to vehicles being parked in restricted areas and attracting fines from the RTO.

Surveys:

Sr.no	Survey Questions	Inference
1.	Are you aware of the parking regulations in your area? 	More than 60% of people are aware of parking regulations in their area. This shows that majority of people are aware of their rules and regulations.
2.	Do you understand the consequences of parking in no parking zones? 	Majority of people are aware of consequences of parking in restricted areas.
3.	How often do you witness vehicles parked in no parking area? 	More than 85% of time people notice vehicles are wrongly parked

4.	Have you experienced delays or inconvenience due to wrongly parked vehicles? 	Almost 65% of time people faces delays and inconvenience due to wrongly parked cars. This shows big problem of wrongly parked cars is
5.	Do you believe that enforcement of parking regulations is effective in your area? 	More than 70% feel that parking regulations enforcement is there in the area. But data shows that 85%-time vehicles are wrongly parked.
6.	What measures do you think can help reduce instances of wrong parking? 	Its is evident from surveys finding that increased fines and more visible signage can reduces instances of wrongly parked cars.

7.	How effective do you think a no parking sign board with sensors, sending notifications to concerned authorities, would be in reducing wrong parking incidents? 	More than 80% people agree that adding a smart no parking board can help in reducing no parking violations.
8.	How do you feel when you see vehicles parked illegally in your neighbourhood? 	More than 70% of people feel annoyed when someone wrongly parks their cars in their neighbourhood.

Outcomes of Primary Data:

Awareness of Parking Regulations: More than 60% of people are aware of parking regulations in their area.

Understanding of Parking Consequences: Majority of people are aware of consequences of parking in restricted areas.

Frequency of Wrong Parking: More than 85% of the time people notice vehicles are wrongly parked.

Impact of Wrong Parking: Almost 65% of the time people face delays and inconvenience due to wrongly parked cars.

Effectiveness of Parking Enforcement: More than 70% feel that parking regulations enforcement is there in the area, but data shows 85% of the time vehicles are wrongly parked.

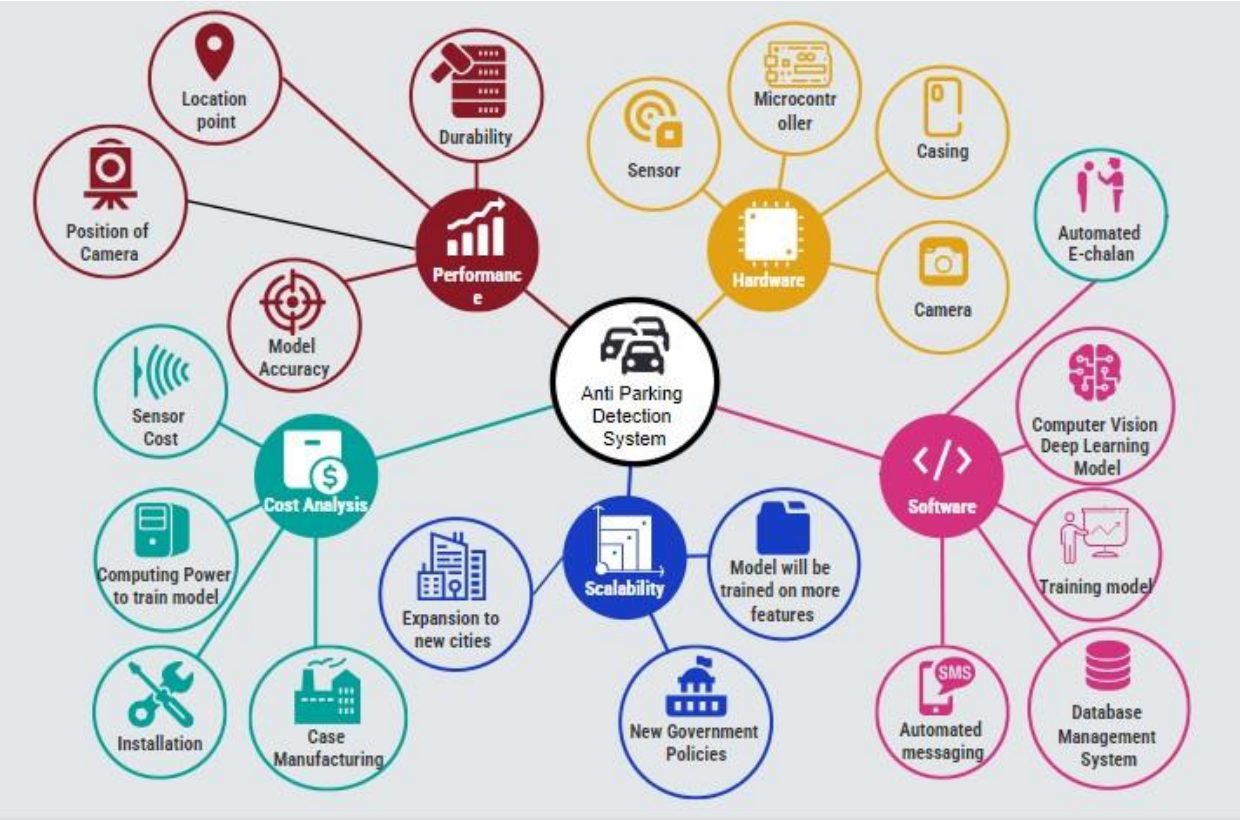
Measures to Reduce Wrong Parking: Increased fines and more visible signage can reduce instances of wrongly parked cars.

Effectiveness of Smart No-Parking Signs: More than 80% of people agree that adding smart no-parking boards with sensors can help reduce violations.

Public Perception of Wrong Parking: More than 70% of people feel annoyed when someone wrongly parks their cars in their neighbourhood.

Design Thinking Tools:

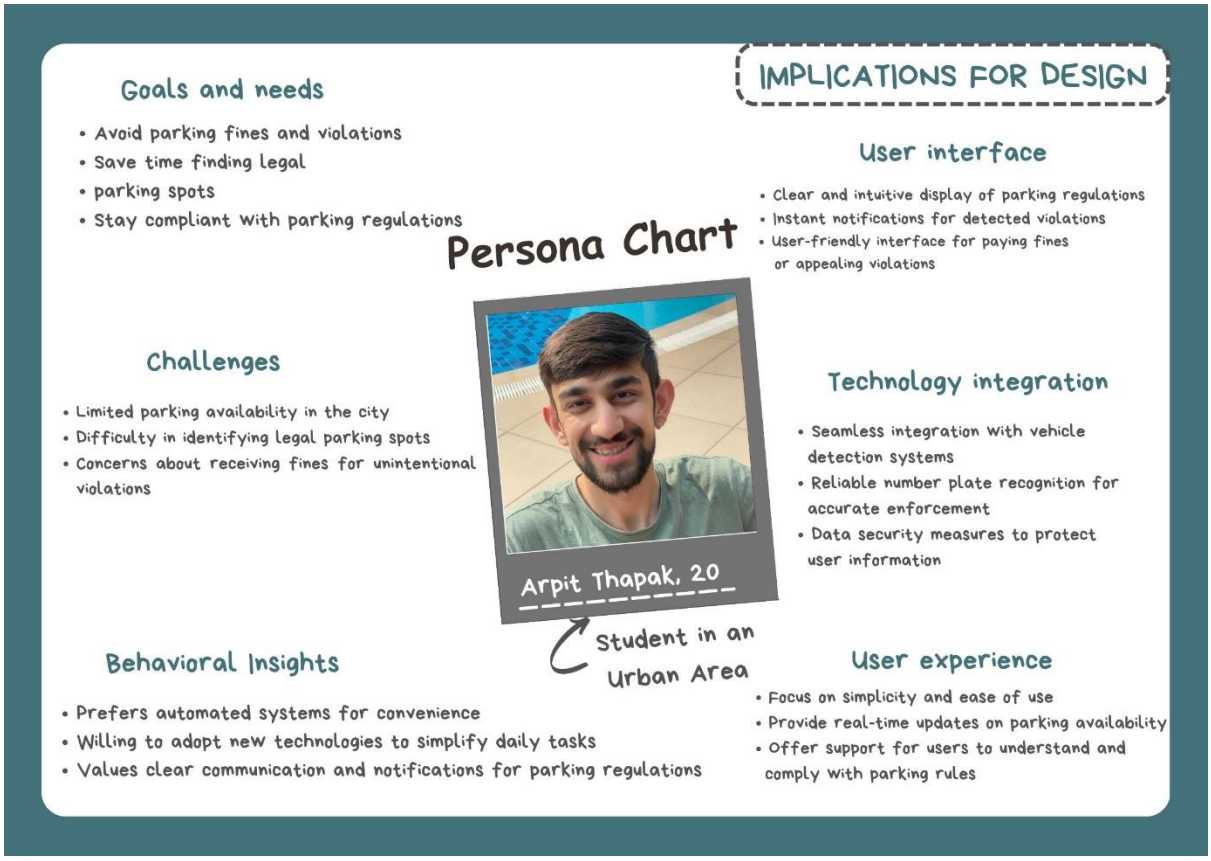
Mind Map



Empathy Map

• Doesn't want roads getting blocked by illegally parked vehicles • Wants vehicle owners who park their vehicle illegally on the roads to get punished more (Increased fines) • Wants the community to be more aware about the parking rules	• Thinks that a smart no parking system would be effective • Does not trust the authorities due to less patrolling • Believes that parking regulations will be effective in their area.
SAY	**THINK**
DOES	**FEEL**
• Avoids parking illegally • Is willing to report instances to respective authorities • Tries to educate others about the parking laws • Has faced problems and been late due to illegally parked vehicles	• Feels frustrated when vehicles are seen parked illegally • Feels frustrated when illegally parked vehicles cause problem • Feels relieved when there is an actual working solution to this problem

Persona chart:



SOLUTION:

The Anti-Parking System you described is an interesting approach to tackling illegal parking.

Used Components:

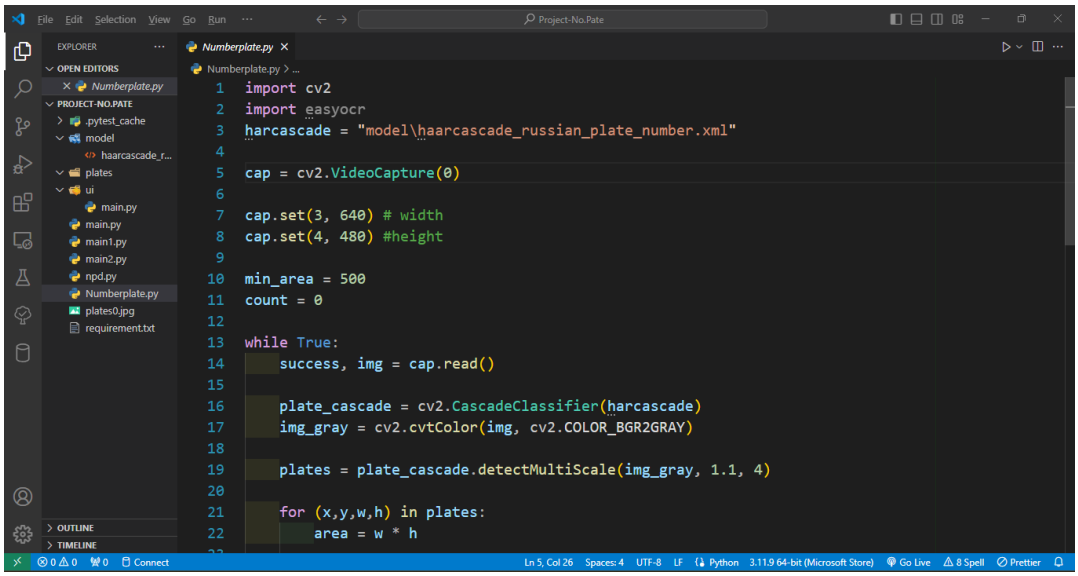
- **AI Model:** This uses pre-trained computer vision model to detect and extract number plate.
- **Cloud Technology:** Helps to store vehicle information in a database and to retrieve and check for the number plate and vehicle owners phone number to send the messages, calls and e-challans.
- **Vehicle Registration Database:** Contains owner information linked to license plates.

Process:

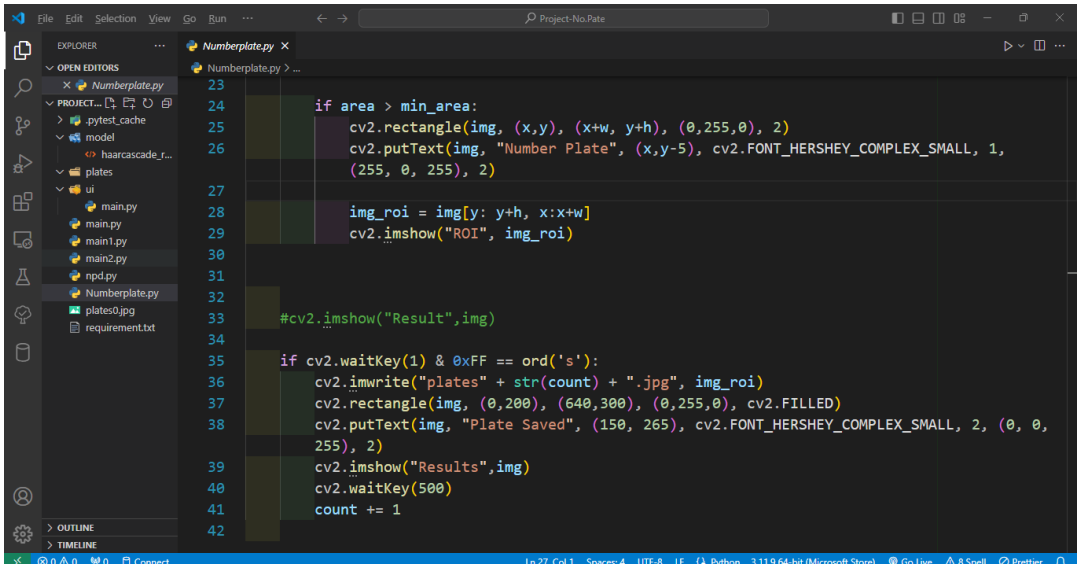
1. **Vehicle Detection:** A camera captures a image of the illegally parked vehicles number plate.
2. **License Plate Recognition:** AI extracts the number plate from the image taken.
3. **Vehicle Owner Identification:** The system searches the database and retrieves the owner's phone number, to verify if it exists in the database.
4. **Automated Warning:** The owner receives a text message informing them of the illegal parking and requesting vehicle removal within 15-20 minutes.
5. **E-Challan Generation:** If the vehicle remains parked in the no parking area after the warned period, an electronic challan (fine) will immediately be generated, and sent via SMS to the owners number.
6. **Towing Notification:** For extended violations, the system can send an alert to the towing authority with vehicle details and location.
7. **Exceptional Cases:** For cases of vehicles or items without a number plate, a voice feature can be which informs the owner with an immediate effect expected. After the warning time is crossed a message will be sent to the towing authorities.

Overall, the Anti-Parking System has the potential to be a valuable tool in combating illegal parking. It can reduce accidents, violence, traffic congestion and it effectively acts as a time saver.

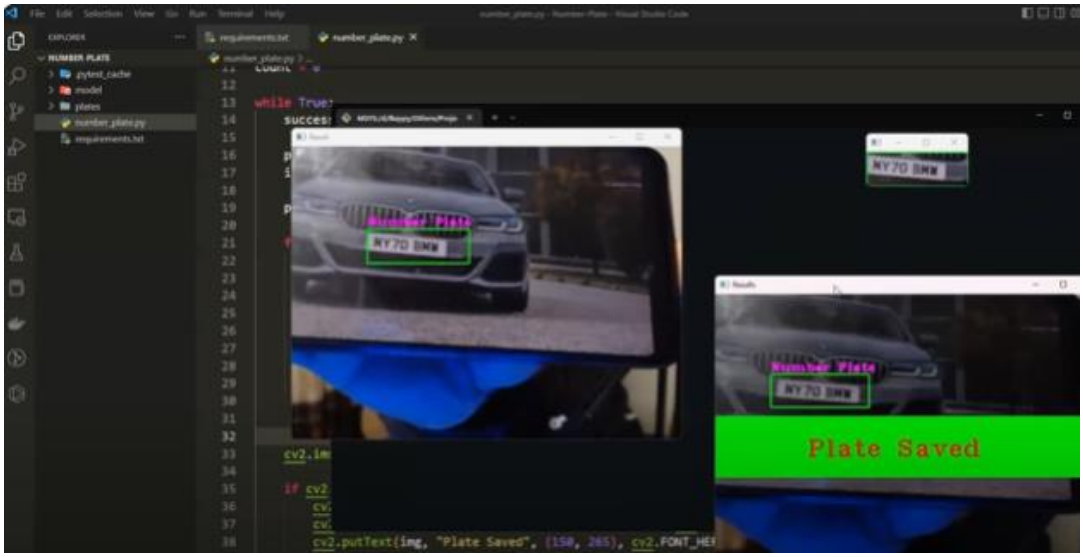
Code for the number plate detection and extraction

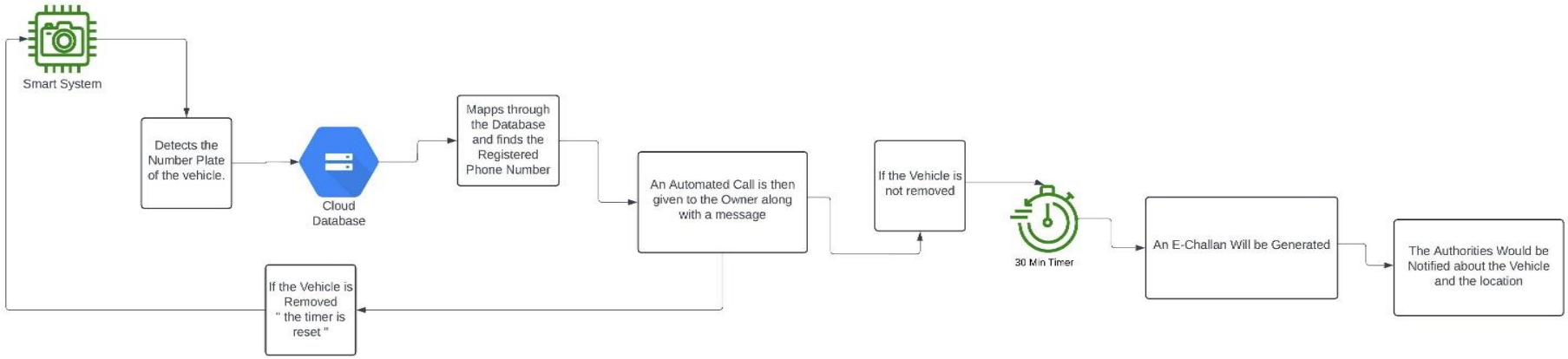


```python
import cv2
import easyocr
harcascade = "model\haarcascade_russian_plate_number.xml"

cap = cv2.VideoCapture(0)

cap.set(3, 640) # width
cap.set(4, 480) #height

min_area = 500
count = 0

while True:
    success, img = cap.read()

    plate_cascade = cv2.CascadeClassifier(harcascade)
    img_gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

    plates = plate_cascade.detectMultiScale(img_gray, 1.1, 4)

    for (x,y,w,h) in plates:
        area = w * h
```



```python
        if area > min_area:
            cv2.rectangle(img, (x,y), (x+w, y+h), (0,255,0), 2)
            cv2.putText(img, "Number Plate", (x,y-5), cv2.FONT_HERSHEY_COMPLEX_SMALL, 1,
            (255, 0, 255), 2)

            img_roi = img[y: y+h, x:x+w]
            cv2.imshow("ROI", img_roi)



    #cv2.imshow("Result",img)

    if cv2.waitKey(1) & 0xFF == ord('s'):
        cv2.imwrite("plates" + str(count) + ".jpg", img_roi)
        cv2.rectangle(img, (0,200), (640,300), (0,255,0), cv2.FILLED)
        cv2.putText(img, "Plate Saved", (150, 265), cv2.FONT_HERSHEY_COMPLEX_SMALL, 2, (0, 0,
        255), 2)
        cv2.imshow("Results",img)
        cv2.waitKey(500)
        count += 1
```




Smart System
Detects the Number Plate of the vehicle.
Cloud Database
Mapps through the Database and finds the Registered Phone Number
An Automated Call is then given to the Owner along with a message
If the Vehicle is not removed
30 Min Timer
An E-Challan Will be Generated
The Authorities Would be Notified about the Vehicle and the location
If the Vehicle is Removed " the timer is reset "