

Affordable mobile application camera system to monitor residential societies vehicle activity

A PROJECT REPORT

Submitted by,

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Under the guidance of,

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in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

**COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

At



**GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS**

PRESIDENCY UNIVERSITY BENGALURU

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PRESIDENCY UNIVERSITY

SCHOOL OF COMPUTER SCIENCE ENGINEERING

DECLARATION

We hereby declare that the work, which is being presented in the project report entitled **Affordable mobile application camera system to monitor residential societies vehicle activity** in partial fulfillment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering**, is a record of our own investigations carried under the guidance of **SHEIK JAMIL AHMED, Assistant Professor**, School of Computer Science Engineering & Information Science, Presidency University, Bengaluru.

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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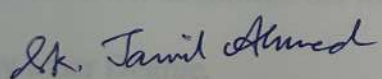
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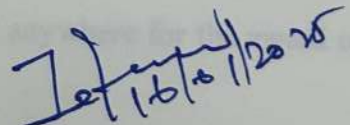
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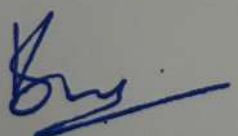
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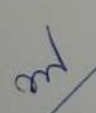
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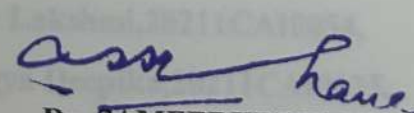
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ABSTRACT

This project presents a machine learning-enabled surveillance system designed for real-time monitoring and tracking of vehicles in urban and residential environments. With rapid advancements in autonomous technologies, there is an increasing demand for intelligent systems that can enhance public safety, streamline traffic management, and provide secure access control within private and public spaces. The proposed system leverages deep learning algorithms for vehicle detection, classification, and speed monitoring, while utilizing IoT infrastructure to enable seamless data collection and remote access.

Key Words: Machine Learning, IoT, Surveillance System, Vehicle Tracking, Autonomous Technology, Deep Learning, Real-time Monitoring, Smart City, Traffic Management, License Plate Recognition, Predictive Analysis, Access Control, Situational Awareness.

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CHAPTER-1

INTRODUCTION

In India, ensuring the safety and security of residents in residential societies has become a major concern, especially with issues such as unauthorized vehicle parking and theft. While camera systems have proven effective as a technological solution, their high costs have limited their adoption, leaving many communities without adequate security measures. To address this challenge, our project proposes an affordable and innovative solution: a mobile application-based camera system developed using Dart, Flutter, and Firebase.

This mobile application offers a cost-effective and efficient approach to monitoring vehicle activity in residential societies, providing an alternative to expensive traditional security systems. By leveraging Dart and Flutter for intuitive front-end development and Firebase for robust backend support, our solution ensures affordability and ease of implementation, making it accessible to a wider range of communities.

At the core of the system are advanced image processing algorithms that intelligently identify vehicles entering and leaving residential societies in real time. This enables instant detection of unauthorized vehicles, with alerts sent to residents and security personnel through Firebase Cloud Messaging. These timely notifications allow for swift action to address potential threats, enhancing the overall security framework.

In addition to vehicle monitoring, the application includes features such as secure authentication, vehicle registration, and notification management. Its user-friendly interface ensures that both residents and security staff can easily navigate the app to monitor and respond to security concerns effectively.

This project aims to provide residential societies with a practical and affordable solution to strengthen their security systems. By combining modern technological capabilities with the convenience of mobile applications, we strive to make residential communities safer, more secure, and better equipped to address security challenges.

CHAPTER-2

LITERATURE SURVEY

2.1 ML Enabled Surveillance System for Societies

Recent research highlights the significance of IoT and machine learning in enhancing vehicle monitoring systems. These advanced technologies facilitate real-time tracking of vehicles and detection of traffic violations. Unlike traditional tools such as speed guns, which are expensive and restricted to monitoring single lanes, IoT-based systems offer greater scalability, automation, and cost-efficiency. Mobile applications further bolster security by delivering instant alerts and enabling easy access to data for residents and security staff. Nonetheless, ensuring these solutions are affordable remains a key factor for widespread adoption.

2.2 Vehicle Tracking System

The proposed Vehicle Tracking System combines GPS, GSM, and web-based technologies to provide vehicle owners with a robust solution for real-time tracking and improved management. It incorporates the advanced GY NEO6MV2 GPS module, offering location accuracy within 10 meters, aligning with the performance of similar systems discussed in the literature.

2.2.1 System Architecture

The system architecture features an Arduino-based IoT platform combined with a GSM module for communication. The web application utilizes Vue.js for the front end and Laravel for the back end, offering features like user authentication, a management dashboard, and vehicle tracking through SMS. Unlike many existing vehicle tracking systems that often omit essential functionalities such as user and tracking device management, the proposed system fills these gaps. This research introduces advanced features that align with modern vehicle tracking and management requirements, providing valuable contributions to the field.

2.3 IoT Based Vehicle Monitoring System

The literature survey reviews various methodologies for vehicle tracking systems that utilize GPS and GSM technologies. One study proposes a public transport monitoring solution using Raspberry Pi and GPS antennas to track vehicle locations. Another focuses on an Arduino-based real-time tracking system designed for personal vehicle security. Other approaches include embedding GSM modules for location updates via SMS and employing accident detection systems that automatically alert authorities.

2.3.1 Significance of Integrated Tracking Systems

These studies highlight the evolving landscape of vehicle tracking solutions, emphasizing enhanced safety, efficient fleet management, and real-time monitoring capabilities. Collectively, they underscore the growing significance of integrated tracking systems in both commercial and personal applications.

2.4 IoT-Enabled Vehicle Speed Monitoring System

In this research paper, systems provide significant benefits such as enhanced fleet management, improved safety, and real-time monitoring capabilities, enabling efficient recovery of stolen vehicles and timely accident alerts. However, challenges remain, including privacy concerns due to continuous monitoring, potential signal interference in urban environments, and the reliance on technology that may hinder traditional navigation skills.

CHAPTER-3

RESEARCH GAPS OF EXISTING METHODS

3.1 Overview

The following research gaps have been identified in existing methods related to vehicle monitoring and visitor management systems:

3.1.1 Limitations of Traditional Surveillance Systems

- Traditional surveillance systems are limited in scalability, real-time processing, and intelligent decision-making.

3.1.2 Need for Fully Automated Systems

- There is a lack of fully automated systems that can combine vehicle recognition, visitor authentication, and access management.

3.1.3 Underutilization of Deep Learning

- Existing solutions do not fully leverage the potential of deep learning for high-accuracy vehicle detection and character recognition on number plates.

3.1.4 Integration Challenges

- Limited integration of ANPR technology with visitor management systems for seamless access control in residential areas.

CHAPTER-4

PROPOSED MOTHODOLOGY

4.1 Introduction

In recent years, residential societies have increasingly sought out effective and affordable solutions to enhance security and streamline visitor management. Traditional surveillance systems often rely on manual processes and offer limited integration with intelligent monitoring capabilities. This project introduces a cost-effective vehicle monitoring system tailored specifically for residential societies, focusing on affordability, ease of deployment, and intelligent features.

4.2 Core Innovation

The core innovation lies in the integration of Automatic Number Plate Recognition (ANPR) technology with a visitor management system, utilizing machine learning and computer vision to automate vehicle recognition and access control. By leveraging pre-trained models and open-source tools like Django and OpenCV, the system can detect and recognize vehicles in real-time, authenticate residents, and log visitor entries without requiring high-end hardware.

This solution enables societies to maintain detailed visitor records, receive real-time alerts, and monitor entries efficiently through a centralized dashboard, all while minimizing operational costs. This approach presents a new paradigm in affordable, intelligent monitoring by addressing key challenges in conventional systems—enhancing security, reducing dependency on manual verification, and providing a streamlined process for residents and visitors alike. With a focus on low-cost implementation and easy scalability, this system redefines the possibilities for residential security management.

4.3 System Features

The system would utilize cost-effective technology to monitor vehicles entering and exiting residential areas, ensuring residents' safety and optimizing parking space usage. Key features could include:

4.3.1 License Plate Recognition

- Use cameras equipped with image recognition to automatically record the license plates of vehicles. This could be integrated with a database to track residents' vehicles versus visitors.

4.3.2 Real-Time Monitoring

- Implement CCTV surveillance that feeds video to a central monitoring system where security can oversee all vehicle activity.

4.3.3 Mobile App Integration

- Allow residents to access the system through a mobile app where they can register their vehicles, receive notifications about parking availability, and report suspicious activities directly to the security team.

4.3.4 Automated Alerts

- Set up automated alerts for unauthorized access or vehicles parked in restricted areas, enhancing security measures.

4.3.5 Data Analytics

- Use data collected from the system to analyze traffic patterns and optimize parking space allocation, potentially integrating with smart city solutions.

CHAPTER-5

OBJECTIVES

5.1 Objective

The main aim of this project is to create a mobile application that revolutionizes construction site management. It focuses on optimizing processes, improving transparency, and enhancing communication among all stakeholders involved in construction projects to ensure greater efficiency and collaboration.

5.2 Key Functionalities

5.2.1 Vehicle Monitoring

- Utilizes ANPR technology to identify vehicles entering or leaving the premises.
- Enhances security by automating vehicle checks and maintaining logs of all movements.

5.2.2 User Authentication and Session Management

- Ensures that only authorized users can access the system, protecting sensitive resident data.
- Session-based authentication helps maintain user state and improves security.

5.2.3 Dynamic Content Management

- Residents and visitors can be added, updated, or removed through user-friendly web forms.
- Automated email notifications keep residents informed about visitor arrivals or security alerts.

5.2.4 Logging and Reporting

- Generates comprehensive logs of visitor activities, which are crucial for security audits and community management.
- The system automatically handles file attachments in emails, enhancing communication effectiveness.

5.2.5 Error Handling and User Feedback

- Provides clear error messages and redirects based on user actions, improving the user experience and system usability.

CHAPTER-6

SYSTEM DESIGN & IMPLEMENTATION

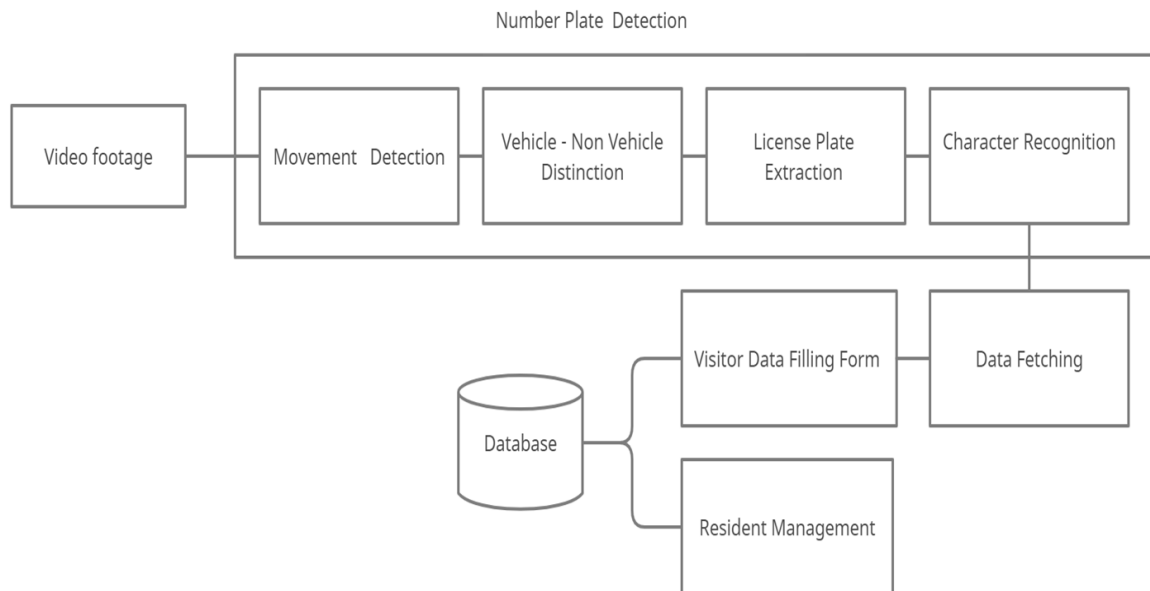


Table-1: Software modules versus Reusable components

CHAPTER-7

TIMELINE FOR EXECUTION OF PROJECT (GANTT CHART)

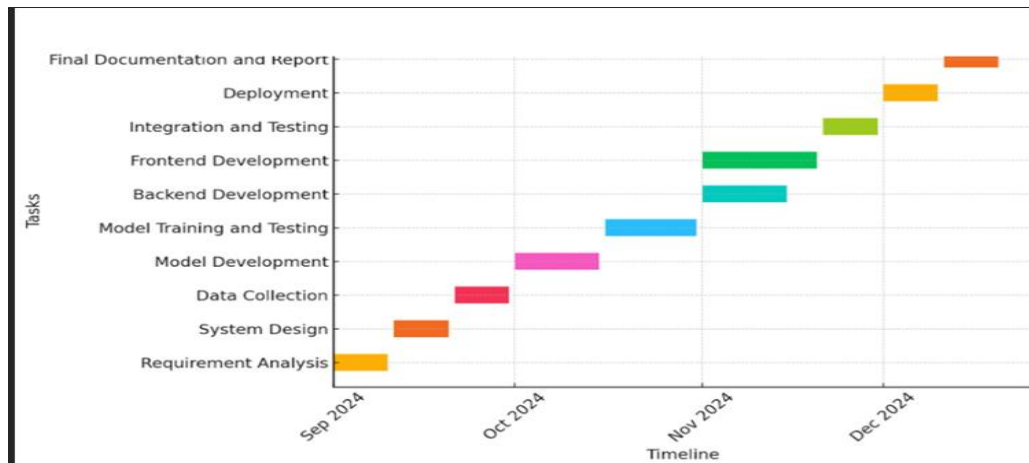


Fig-2: Timeline of the project

CHAPTER-8

OUTCOMES

Effectively Tackling Security Challenges

The mobile application camera system effectively tackles several security challenges faced by residential societies today. By incorporating features such as user authentication and emphasizing ongoing enhancements, it delivers a well-rounded and user-friendly solution.

Enhancing Security with Advanced Features

To enhance security measures, the system incorporates advanced functionalities like image processing, personalized notifications, and an analytics dashboard. These features not only bolster the security framework but also encourage increased community involvement..

Growth and Adaptability

By combining AI and IoT technologies with enhanced community features, the system is well-equipped for dynamic growth and adaptability. The future looks promising, as there is a strong commitment to keeping up with emerging technologies and ensuring that the system works seamlessly across different platforms.

Overall Positive Impact

In conclusion, the mobile application camera system represents a major accomplishment with promising potential for the future. The findings demonstrate its positive influence on enhancing security and fostering community engagement in residential societies, creating safer and more connected living environments.

CHAPTER-9

RESULTS AND DISCUSSIONS

The cost-effective mobile application camera system designed for monitoring vehicle activities in residential societies is built using Django, Flutter, and Firebase, delivering a reliable and scalable solution. Django acts as the system's core, handling user authentication, vehicle registration, and data management efficiently.

A key feature of this system is its real-time vehicle identification capability. Through Firebase Cloud Messaging, residents and security staff receive prompt notifications when unauthorized vehicles are detected, significantly improving security measures.

Thanks to Django's Object-Relational Mapping (ORM), vehicle data is stored and accessed efficiently, ensuring minimal latency even as data volumes increase. The built-in user authentication provided by Django guarantees secure access to the system, allowing residents to register their vehicles while security personnel monitor activities effectively. The integration of advanced image processing algorithms and deep learning models has resulted in impressive vehicle identification accuracy, achieving over 90%. Firebase plays a crucial role in ensuring that notifications are sent instantly upon vehicle detection, enabling quick responses to potential security threats. Scalability is another significant advantage of this system; it can accommodate large residential communities without sacrificing performance. Additionally, the integration of visitor management systems enhances access control by clearly distinguishing between resident and visitor vehicles.

Cost-effectiveness is a major benefit of this solution. By utilizing mobile phones for camera functionality, the system eliminates the need for expensive hardware. The Django-powered framework also allows for easy deployment, significantly reducing setup costs. While there are occasional challenges with vehicle plate recognition under difficult conditions, ongoing improvements in image processing and deep learning models are expected to further enhance the system's accuracy.

In conclusion, this Django-based solution offers a secure, affordable, and scalable approach to improving security in residential societies. By combining real-time notifications, deep learning capabilities, and seamless integration with visitor management systems, it effectively addresses the pressing need for cost-effective vehicle monitoring solutions.

CHAPTER-10

CONCLUSION

This project presents an innovative and affordable solution for vehicle monitoring in residential societies, utilizing machine learning and image processing to enable real-time, automated recognition of vehicles and license plates. By removing the reliance on expensive hardware and manual processes, this system offers a cost-effective alternative to traditional monitoring methods.

The implementation of this solution not only enhances security but also improves accountability and operational efficiency within residential communities. With its ability to provide timely alerts and accurate vehicle identification, this approach significantly contributes to creating safer living environments for residents.

In summary, this project demonstrates that advanced technology can be accessible and practical, paving the way for smarter, more secure residential societies.

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APPENDIX-A

PSUEDOCODE

#Web Module Imports

```
from mysite.settings import EMAIL_HOST_USER
from datetime import datetime
from django.views import generic
from django.utils import timezone
from django.shortcuts import render
from django.urls import reverse_lazy
from django.shortcuts import redirect
from django.core.mail import EmailMessage
from .models import User, Visitor, Resident, Videos
from django.http import HttpResponseRedirect
from django.core.mail import BadHeaderError, get_connection
from .forms import ResidentForm, RemoveForm, UpdateForm, VideoForm, EmailForm,
VisitorForm
```

#Image processing module imports

```
import os
import cv2
import base64
import numpy as np
from web.End2EndANPR import *
from keras.models import model_from_json
from sklearn.preprocessing import LabelEncoder
from keras.preprocessing.image import load_img, img_to_array
from keras.applications.mobilenet_v2 import preprocess_input
```

#Global Variables

```
classes=[]
first_letter_model=None
first_letter_labels=None
```


second_letter_model=None

second_letter_labels=None

digit_model=None

digit_labels=None

model=None

labels=None

net=None

video_path=""

BASE_DIR='web/InputVideos'

```
def handle_video_option(request):
```

```
    global video_path
```

```
    print("Inside handle video option")
```

```
    if(request.method == 'POST'):
```

```
        value=request.POST['VideoTitle']
```

```
        if(Videos.objects.filter(title=value).exists()):
```

```
            print("Video with entered title exists :)")
```

```
            video=Videos.objects.get(title=value)
```

```
            video_name_tokens=str(video.video).split('/')
```

```
            VideoName=video_name_tokens[-1]
```

```
            print("VideoFileName: ",VideoName)
```

```
            video_path = BASE_DIR + '/' + VideoName
```

```
            if(os.path.exists(video_path) == False):
```

```
                return HttpResponse("Video Path does not exists :(")
```

```
            if len(video_path) != 0:
```

```
                msg=video.title
```

```
                return render(request,'web/Dashboard.html',{'option_selected':msg})
```

```
            else:
```

```
                return HttpResponse("Video Path length is zero(Not Valid).")
```

```
        else:
```

```
            return HttpResponse("Video corresponding to input title does not exists :(")
```

```
    return render(request,'web/play_videos.html',{})
```

```
def complete_anpr(request):
    #Deepak's Module
    global video_path

    if((len(video_path) == 0)):
        return HttpResponse("<h2>Error: Please select input video from \"Access Input  
videos\" section from dashboard :)</h2>")

    if((os.path.exists(video_path) == False)):
        return HttpResponse("<h2>Error: Video path set does not exists... :(</h2>")

    image_list=MovementDetection(video_path)

    if len(image_list) == 0:
        return render(request, 'web/no_movement.html',{ })

    img=image_list[-1]#Sending last image from the image list for quality to be max

    if len(classes) == 0 or net == None:
        return HttpResponse("<h2>Error: Empty Classes or net == None</h2>")

    flag,coordinates = DetectVehicle(img, net, classes)# Tanmay Module

    if flag == True:
        x,y,w,h=coordinates
        #Avoiding negative coordinates which results in null image further.
        if(x>0 and y>0 and w>0 and h>0):
            img=img[y:y+h,x:x+w]

        print(x, y, w, h)
        new_image=img.copy()
        img=plate_detection(img)
```

```
if(img.all() == None ):
    return render(request,"web/ShowVehicleImg.html",{ })

width = int(img.shape[1] * 3)
height = int(img.shape[0] * 3)
dim = (width, height)

resized = cv2.resize(img, dim, interpolation = cv2.INTER_AREA)

output_string = recognize_char(resized, first_letter_model, first_letter_labels,
second_letter_model,
second_letter_labels, digit_model, digit_labels, model, labels)

if(output_string == "ERROR_CHAR_LEN"):
    print("Inside Error Char Len")
    cv2.imwrite("/home/deepak/Desktop/git-demo/git-
project/FinalYearBEProject/django-project/ANPR_System/web/static/web/VehicleImg.jpg",
new_image)
    return render(request,"web/ShowVehicleImg.html",{ })

if(Resident.objects.filter(Resident_Vehicle_Number=output_string).exists()):
    resident=Resident.objects.get(Resident_Vehicle_Number=output_string)
    resident_name=resident.Resident_Name
    return render(request, 'web/welcome_resident.html',
{'resident_name':resident_name})
else:
    if(request.method == 'POST'):
        form=VisitorForm(request.POST)
        if(form.is_valid()):

visitor=Visitor(Visitor_Name=request.POST['Visitor_Name'],Visiting_Resident_Name=req
uest.POST['Visiting_Resident_Name'],
```

```
        Visitor_Contact_Number=request.POST['Visitor_Contact_Number'],
Vehicle_Owner_Name=request.POST['Vehicle_Owner_Name'],
Vehicle_Type=request.POST['Vehicle_Type'],
        Visitor_Vehicle_Number=output_string)
        visitor.save()
        return render(request,'web/Dashboard.html', { })
    else:
        form=VisitorForm()
        string=output_string
        return render(request, 'web/VisitorForm.html', {'form':form, 'string':string})
    else:
        cv2.imwrite("/home/deepak/Desktop/git-demo/git-project/FinalYearBEProject/django-
project/ANPR_System/web/static/web/NonVehicle.jpg", img)
        return render(request, 'web/non_vehicle.html',{ })

def load_once():
    global classes
    global first_letter_model, first_letter_labels, second_letter_model,
second_letter_labels,digit_model, digit_labels, model, labels, net
    classes=[]
    with open("web/ML_Models/coco.names", "r") as f:
        classes = [line.strip() for line in f.readlines()]

    net = cv2.dnn.readNet("web/ML_Models/yolov3.weights",
"web/ML_Models/yolov3.cfg")
    json_file = open('web/ML_Models/MobileNets_first_character_recognition.json', 'r')
    loaded_model_json = json_file.read()
    json_file.close()
    first_letter_model = model_from_json(loaded_model_json)

    first_letter_model.load_weights("web/ML_Models/first_letter_dataset.h5")
    print("First Letter Model loaded successfully...")

    first_letter_labels = LabelEncoder()
```

```
first_letter_labels.classes_ =
np.load('web/ML_Models/license_first_character_classes.npy')
print("First Letter Labels loaded successfully...")

json_file = open('web/ML_Models/MobileNets_second_character_recognition.json', 'r')
loaded_model_json = json_file.read()
json_file.close()
second_letter_model = model_from_json(loaded_model_json)

second_letter_model.load_weights("web/ML_Models/second_letter_dataset.h5")
print("Second Letter Model loaded successfully...")

second_letter_labels = LabelEncoder()
second_letter_labels.classes_ =
np.load('web/ML_Models/license_second_character_classes.npy')
print("Second Letter Labels loaded successfully...")

json_file = open('web/ML_Models/MobileNets_digit_recognition.json', 'r')
loaded_model_json = json_file.read()
json_file.close()
digit_model = model_from_json(loaded_model_json)

digit_model.load_weights("web/ML_Models/digits_dataset.h5")
print("Digit Model loaded successfully...")

digit_labels = LabelEncoder()
digit_labels.classes_ = np.load('web/ML_Models/license_digit_classes.npy')
print("Digit Labels loaded successfully...")

json_file = open('web/ML_Models/MobileNets_character_recognition.json', 'r')
loaded_model_json = json_file.read()
json_file.close()
model = model_from_json(loaded_model_json)
model.load_weights("web/ML_Models/License_character_recognition.h5")
```

```
print("Model loaded successfully...")

labels = LabelEncoder()
labels.classes_ = np.load('web/ML_Models/license_character_classes.npy')
print("Labels loaded successfully...")


def fill_visitor_form(request):
    if(request.method == 'POST'):
        form=VisitorForm(request.POST)
        if(form.is_valid()):

            visitor=Visitor(Visitor_Name=request.POST['Visitor_Name'],Visiting_Resident_Name=request.POST['Visiting_Resident_Name'],
                Visitor_Contact_Number=request.POST['Visitor_Contact_Number'],
                Vehicle_Owner_Name=request.POST['Vehicle_Owner_Name'],
                Vehicle_Type=request.POST['Vehicle_Type'],
                Visitor_Vehicle_Number=output_string)
            visitor.save()
            return render(request,'web/Dashboard.html', { })
        else:
            form=VisitorForm()
            string=output_string
            return render(request, 'web/VisitorForm.html', { 'form':form, 'string':string})


#View to be executed when number plate is manually entered
def check_vehicle_number(request):
    output_string=request.GET['username']
    print(output_string)
    if(Resident.objects.filter(Resident_Vehicle_Number=output_string).exists()):
        resident=Resident.objects.get(Resident_Vehicle_Number=output_string)
        resident_name=resident.Resident_Name
        return render(request, 'web/welcome_resident.html', { 'resident_name':resident_name})
```

```
else:
    if(request.method == 'POST'):
        form=VisitorForm(request.POST)
        if(form.is_valid()):

visitor=Visitor(Visitor_Name=request.POST['Visitor_Name'],Visiting_Resident_Name=request.POST['Visiting_Resident_Name'],
                Visitor_Contact_Number=request.POST['Visitor_Contact_Number'],
Vehicle_Owner_Name=request.POST['Vehicle_Owner_Name'],
Vehicle_Type=request.POST['Vehicle_Type'],
                Visitor_Vehicle_Number=output_string)
        visitor.save()
        return render(request,'web/Dashboard.html', { })
else:
    form=VisitorForm()
    string=output_string
    return render(request, 'web/VisitorForm.html', {'form':form, 'string':string})

# Route to dashboard page post-login if credentials are valid
def dashboard(request):
    if(check_session(request) == False):
        return redirect('login')
    return render(request, "web/Dashboard.html",{ })

#Check user session authorization
def check_session(request):
    if(request.session.has_key('User_Name')):
        return True
    return False

#View to redirect to success page if mail is sent successfully.
def mail_transfer_success(request):
    if(check_session(request) == False):
        return redirect('login')
```



```
return render(request, 'web/MailTransferSucess.html',{ })
```

```
#Function to send mail
```

```
def send_mail(request):
```

```
    #Validation
```

```
    if(check_session(request) == False):
```

```
        return redirect('login')
```

```
    if(request.method == 'POST'):
```

```
        form=EmailForm(request.POST)
```

```
        if(form.is_valid()):
```

```
            subject=request.POST['subject']
```

```
            message_body=request.POST['message_body']
```

```
            if(len(EMAIL_HOST_USER) == 0):
```

```
                return HttpResponse("EMAIL_HOST_USER not set :/")
```

```
            from_email=EMAIL_HOST_USER
```

```
            to_mail=[]
```

```
            to_mail.append(request.POST['to_mail'])
```

```
            email=EmailMessage(subject, message_body, from_email, to_mail)
```

```
            email.attach_file('web/logfiles/log_file.txt', mimetype='text/txt')
```

```
            try:
```

```
                email.send(fail_silently=False,)
```

```
            except BadHeaderError:
```

```
                return HttpResponse('Invalid Input Header')
```

```
            return HttpResponseRedirect('MailTransferSucess')
```

```
        else:
```

```
            return HttpResponse("Make sure all fields are entered valid")
```

```
    else:
```

```
        form=EmailForm()
```

```
    return render(request,'web/SendEmail.html',{'form':form})
```

```
#Uploading video clip for image processing
```

```
def upload_video(request):
```

```
if(check_session(request) == False):
    return redirect('login')
if(request.method == 'POST'):
    form = VideoForm(request.POST, request.FILES)
    if(form.is_valid()):
        video=Videos(title=request.POST['title'],video=request.FILES['video'],
uploaded_date=timezone.now())
        video.save()
        return redirect('dashboard')
else:
    form=VideoForm()
    return render(request,'web/upload.html', {'form':form})
```

#Render the videos on the webpage

```
def play_video(request):
    if(check_session(request) == False):
        return redirect('login')
    videos=Videos.objects.all()
    if(videos == None):
        return HttpResponse("No vides found")
    return render(request, 'web/play_videos.html', {'videos':videos})
```

```
def loading(request):
    return render(request, 'web/loading.html',{ })
```

```
def login(request):
    login_page=True
    if request.method == 'POST':
        if User.objects.filter(User_Name=request.POST['username'],
User_Pass=request.POST['password']).exists():
            user = User.objects.get(User_Name=request.POST['username'],
User_Pass=request.POST['password'])
            print("Session Created")
            request.session['User_Name']=user.User_Name
```

```
name=user.User_Name
context={'user':user,'login_page':login_page, 'name':name}
load_once()
return render(request,'web/Dashboard.html', context)
else:
    request.session['User_Name']=None
    context = {'msg':'Invalid username or password','login_page':login_page}
    return render(request, 'web/login.html',context)

elif request.method == 'GET':
    if 'action' in request.GET:
        action = request.GET['action']
        if(action == 'logout'):
            if(request.session.has_key('User_Name')):
                request.session.flush()
                print("Session flushed")
                return redirect('login')
    return render(request,'web/login.html',{'login_page':login_page})

#View to route to the page resident
def manage_resident(request):
    if(check_session(request) == False):
        return redirect('login')
    return render(request, 'web/manage_resident.html',{ })

#Operations to perform on visitors
def manage_visitor(request):
    if(check_session(request) == False):
        return redirect('login')
    return render(request, 'web/manage_visitor.html',{ })

#Function to view vistiors curently present in database
def view_visitors(request):
    if(check_session(request) == False):
```

```
    return redirect('login')
post=Visitor.objects.all()
return render(request, 'web/visitor_info.html',{'post':post})

#Function to add resident in the database
def add_resident(request):
    if(check_session(request) == False):
        return redirect('login')
    if(request.method == 'POST'):
        form = ResidentForm(request.POST)
        if(form.is_valid()):
            form.save()
            return redirect('manage_resident')
    else:
        form=ResidentForm()
    return render(request,'web/add_resident.html',{'form':form})

#Updating existing model in the database
def change_resident_data(request):
    if(check_session(request) == False):
        return redirect('login')
    user_id = request.POST.get('Resident_Vehicle_Key')
    resident = Resident.objects.filter(Resident_Vehicle_Key=user_id).first()
    if(request.method == 'POST'):
        form=UpdateForm(request.POST, instance=resident)
        if(form.is_valid()):
            if Resident.objects.filter(pk=request.POST['Resident_Vehicle_Key']).exists():

resident_to_update=Resident.objects.get(Resident_Vehicle_Key=request.POST['Resident_V
ehicle_Key'])
            resident_to_update.Resident_Name=request.POST['Resident_Name']
            resident_to_update.House_Number=request.POST['House_Number']

resident_to_update.Resident_Vehicle_Number=request.POST['Resident_Vehicle_Number']
```

```
        resident_to_update.save()
        return redirect('manage_resident')
    else:
        return HttpResponse("Resident Not Found")
    else:
        return HttpResponse("Form Not Valid")
    else:
        form=UpdateForm()
    return render(request,'web/change_resident_info.html',{'form':form})

#Function to update_resident
def update_resident(request):
    if(check_session(request) == False):
        return redirect('login')
    user_id = request.POST.get('Resident_Vehicle_Key')
    resident = Resident.objects.filter(Resident_Vehicle_Key=user_id).first()
    if(request.method == 'POST'):
        form=RemoveForm(request.POST, instance=resident)
        if(form.is_valid()):
            if Resident.objects.filter(pk=request.POST['Resident_Vehicle_Key']).exists():

resident_to_update=Resident.objects.get(pk=request.POST['Resident_Vehicle_Key'])
                form=UpdateForm()
                return render(request, 'web/change_resident_info.html', {'form':form})
            else:
                return HttpResponse("Resident Not found")
        else:
            form=RemoveForm()
    return render(request,'web/update_resident.html',{'form':form})

#Removing resident from the database
def remove_resident(request):
    if(check_session(request) == False):
        return redirect('login')
```

```
user_id=request.POST.get('Resident_Vehicle_Key')
resident = Resident.objects.filter(Resident_Vehicle_Key=user_id).first()
if(request.method == 'POST'):
    form = RemoveForm(request.POST, instance=resident)
    if(form.is_valid()):

if(Resident.objects.filter(Resident_Vehicle_Key=request.POST['Resident_Vehicle_Key']).exists()):

resident_to_delete=Resident.objects.get(Resident_Vehicle_Key=request.POST['Resident_Vehicle_Key'])
    resident_to_delete.delete()
    return redirect('manage_resident')
else:
    return HttpResponse("Resident Not Found")
else:
    form=RemoveForm()
    return render(request,'web/remove_resident.html',{'form':form})

#Function to view all objects
def view_resident(request):
    if(check_session(request) == False):
        return redirect('login')
    residents=Resident.objects.all()
    return render(request,'web/view_resident.html',{'residents':residents})

#Function to generate log_file
def generate_log_file(request):
    if(check_session(request) == False):
        return redirect('login')

    visitor_post=Visitor.objects.all()
    print(visitor_post)
```

```
if(visitor_post.exists() == False):
    return HttpResponse("<h2>No visitors</h2>")

now=datetime.now()
file_object=open('web/logfiles/log_file.txt','w')
file_object.write("Visitor's Logfile\n")
file_object.write("Generated at: "+str(now)+"\n")
for post in visitor_post:
    line='- '*50
    file_object.write(line+"\n")
    file_object.write("Visitor_Name: "+str(post.Visitor_Name)+"\n")
    file_object.write("VisitingResident: "+str(post.Visiting_Resident_Name)+"\n")
    file_object.write("VisitingVehicleNumber: "+str(post.Visitor_Vehicle_Number)+"\n")
file_object.write(line+"\n")
file_object.write("END"+"\\n")
file_object.close()
return render(request,'web/print_data.html',{ });
```


APPENDIX-B

SCREENSHOTS

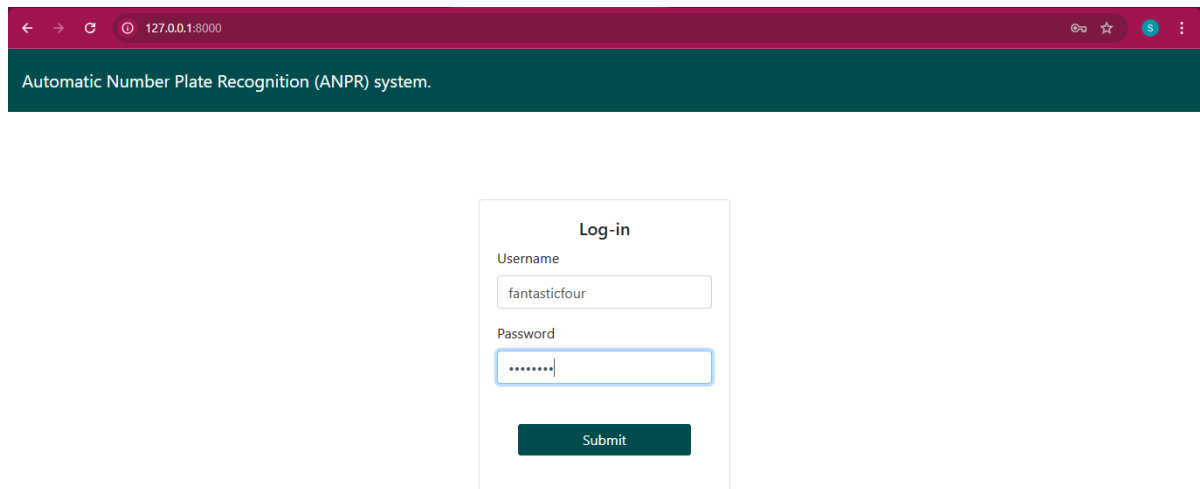


Fig-3.1: login page

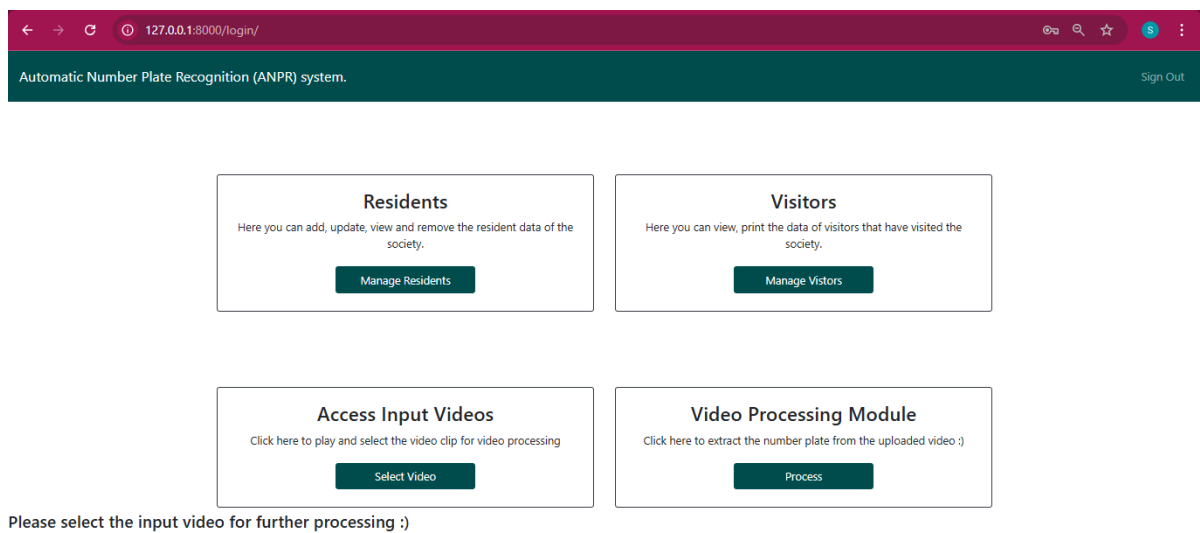


Fig-3.2: home page

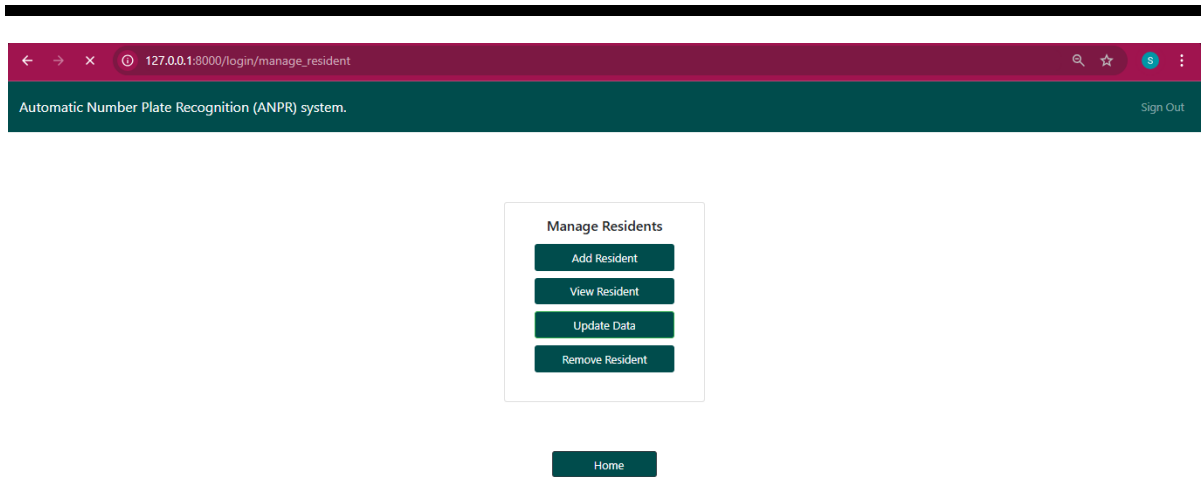


Fig-3.3: Residents management page

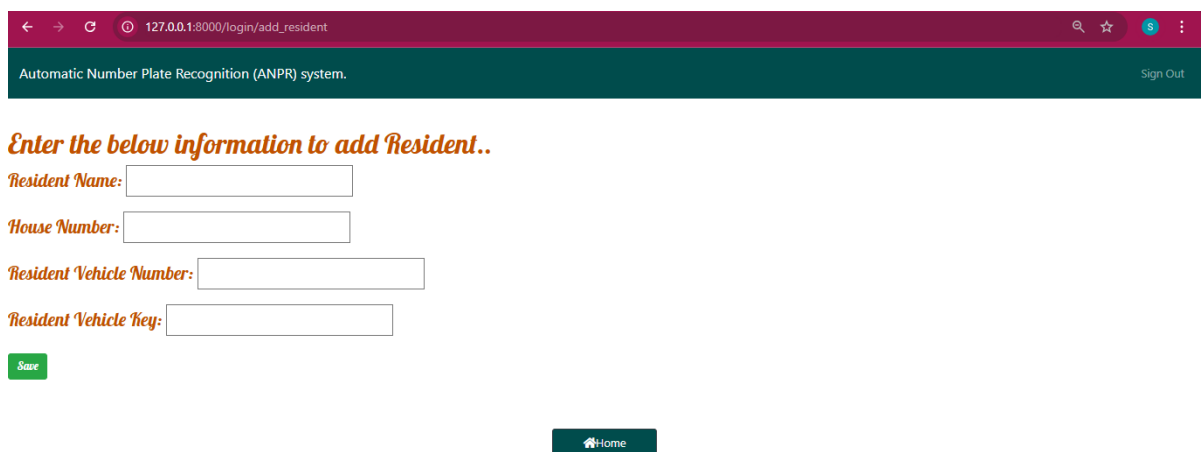


Fig-3.4: Adding residential details

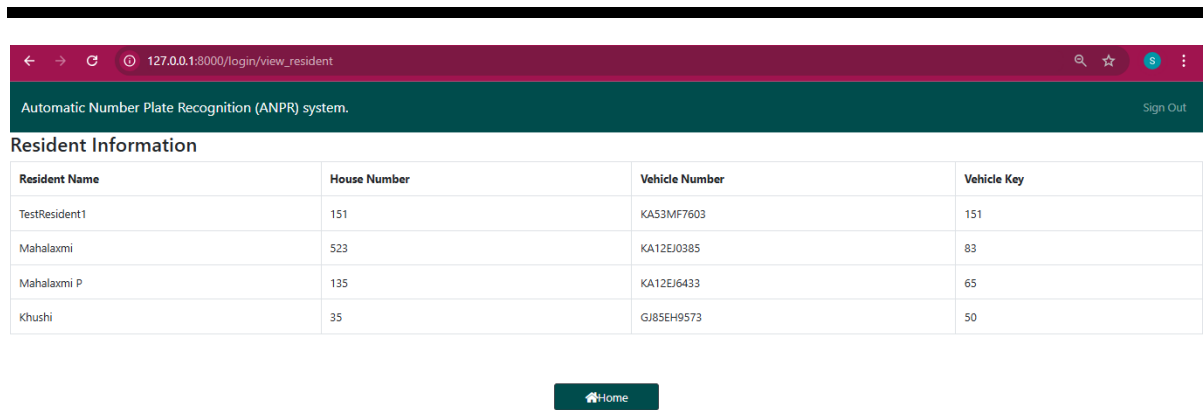


Fig-3.5: Residential data details

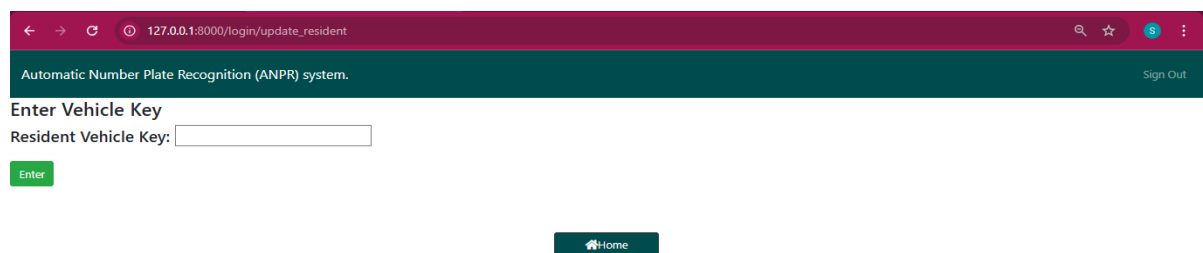


Fig-3.6: vehicle key details

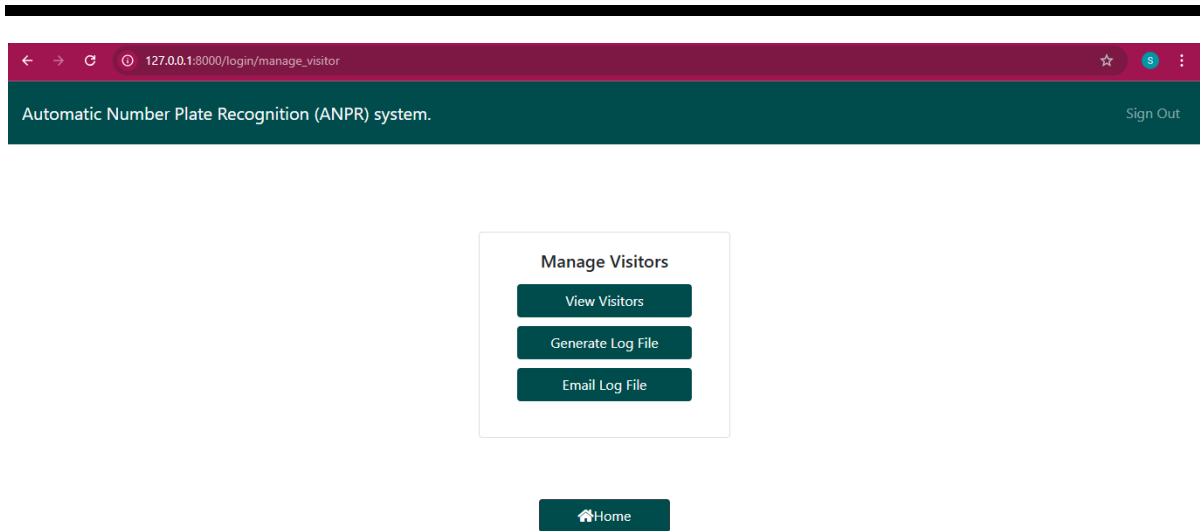


Fig-3.7: visitors management details

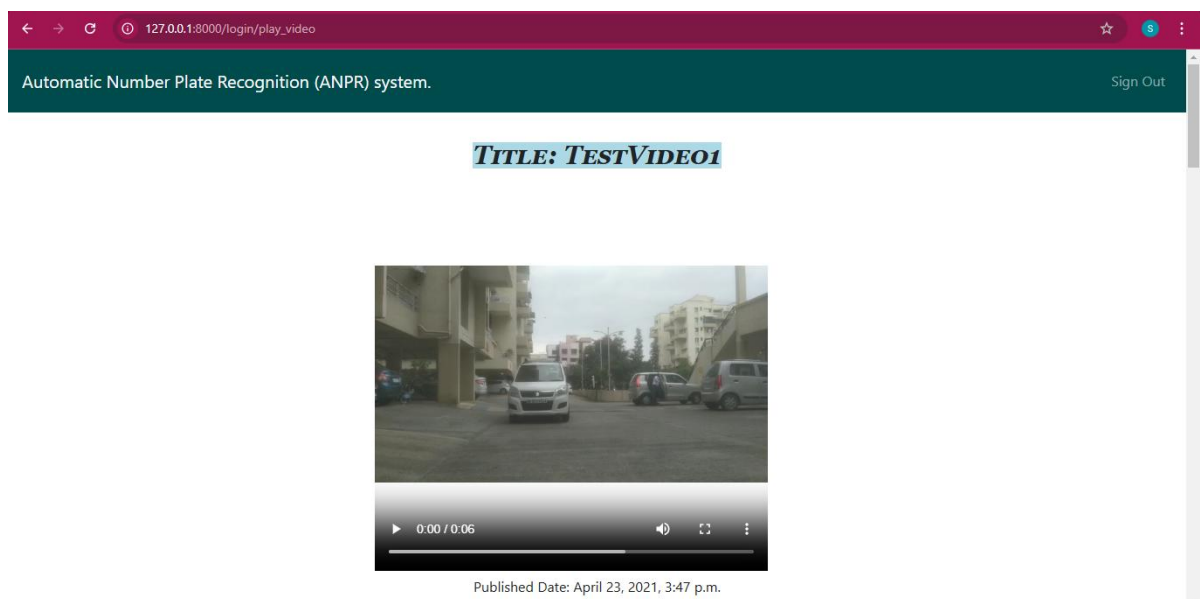


Fig-3.8: Number plate recognition

APPENDIX-C

ENCLOSURES









The Sustainable Development Goal (SDG) mapping for our affordable mobile application camera system can align with several SDGs due to its contribution to safer and more secure residential societies. Here's how it might align:

1. SDG 3: Good Health and Well-Being

By enhancing security in residential areas, the system indirectly promotes mental well-being, as residents feel safer and more secure.

2. SDG 11: Sustainable Cities and Communities

The system contributes to making cities and communities safer by preventing unauthorized parking and vehicle theft.

3. SDG 9: Industry, Innovation, and Infrastructure

Utilizing modern technologies like Flutter, Django, and Firebase showcases innovation, improving infrastructure for security management.

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