

# TECHNICAL DOCUMENTATION

# PRA-VIGIL

| Presented By

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# PRA-VIGIL DOCUMENTATION

This documentation contains the detailed overview of my project PRA-VIGIL - AI driven Automated License plate reader security for gated communities. This Automated license plate detection technology is currently being used across different industries for law enforcement and security, parking management, Automated toll collection( FASTag), Commercial and fleet management etc.

Myself being a AI enthusiastic and with the zeal of learning the new things by experimenting with the technologies that I learnt in my academics I started doing this project .As there are multiple implementations that are already going on regarding this topic in public domain, I took the idea of implementing this project for security management in gated communities. Main reason behind this is to test my practical knowledge and gain extra knowledge in this process of implementing this project.

The name PRA-VIGIL is a combination of Sanskrit and Latin words , **PRA** stands for **protection** from Sanskrit and **VIGIL** stands for **watchfulness** or **alertness** from Latin.

## Github repository link:

<https://github.com/21a31a4324/PraVigil>



My Project automates the intelligent license plate recognition using image processing, deep learning and optical character recognition ensuring real time performance. This system improves operational efficiency and scalability while replacing manual methods used for security check process in gated communities. This project is developed for gated community admin usage purpose and residents can login through the ID given to them for otp generation only.

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## MOTIVE

Manual license plate recognition requires more man power and human expertise to an extent which often suffers from human errors, inconsistencies, and inefficiencies. Traditional methods cannot scale effectively to meet modern demands that call for security. The need for an automated solution is more emphasized by the challenges that are being faced in terms of man force and security. Developing an automated, and scalable system that addresses these challenges is critical for applications in access control.

## SYSTEM ARCHITECTURE

Every problem or challenge will have a solution in order to achieve less manual efforts and more secure access control systems for gated communities I came up with the idea of implementing the Automated license plate recognition.

**Input:** Image upload in my access check page.

**Step 1:** YOLOv5 detects license plates.

**Step 2:** Detected plates cropped and fed into easyocr.

**Step 3:** CRNN extracts text characters.

**Output:** License plate number along with details of the person corresponding to it.

**Step 4:** Now the license plate number that is extracted will be checked in blacklist.csv file if matches access denied popup will be opened in my un\_matched.html file.

**Step 5:** Next it will be checked in the residents.csv file if the vehicle\_no matches then access granted popup will be shown in matched.html file.

**Step 6:** If vehicle\_no is not found in both the .csv files the user will be redirected to non\_resident.html file.

**Step 7:** In this it will ask for whether the person is coming for order/delivery or coming to visit a person in the community. In order to grant the access residents community ID or phone no should be verified for security reasons.

**Step 8:** Upon community ID verification, Otp verification will be done. Currently for otp verification I am generating a random six digit number which will be generated using residents ID by the residents in Resident login page (user\_login.html). The otp generated by resident should match with the one entered by the non resident in order to get access.

**Step 9:** If otp matches access will be granted

**Step 10:** If not matches access will be denied and vehicle\_no will be added to suspect list

**Step 11:** If otp failure increases more than 3 times then the vehicle\_no will be added to blacklist

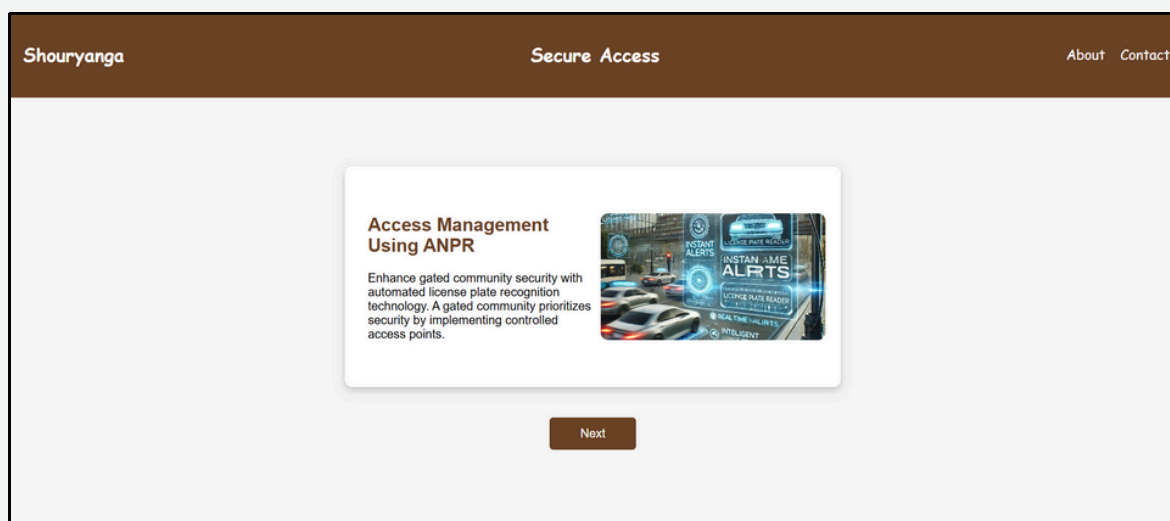
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To achieve the detection of license plate and extraction of license plate number , I prepared a custom dataset of 1000 images . I collected those images from google and I captured some of them manually . I trained my deep learning model using this custom dataset . I used the 80% of images for training and remaining 20% for testing my model. I used YOLOV5 for detection and Easy OCR for extraction of digits from license plate. You can see the best.pt file in my repository which have extracted features and fully trained model for ALPR.

## FEATURES OF PRA-VIGIL:

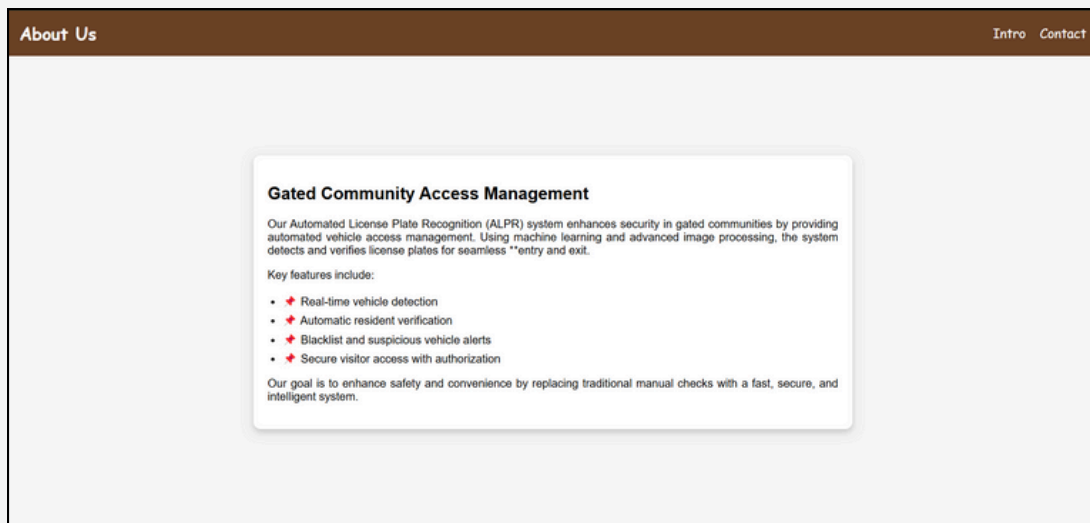
- The above mentioned procedure will happen in access\_check.html page.
- We can see the residents of community in residents.html page along with their personal details.
- We can see the Vehicle numbers that are in suspect list
- We can see the Vehicle numbers that are in block list.
- We can add a new resident to our community by using the add resident button in home page.
- We can delete the resident from residents , suspect and blocklist using delete resident button.
- We can check the statics of number of vehicles entered , block listed vehicles, suspect list vehicles and access granted vehicles in a responsive dashboard which contains both bar graph and donut chat.

## DETAILED WORKING IMAGES OF PROJECT:

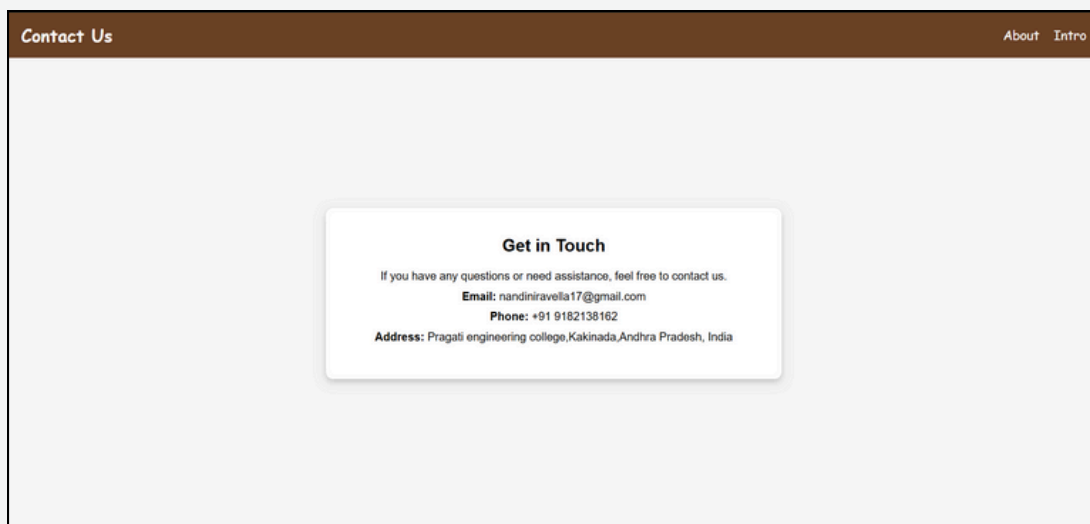


This is the introduction page of my project

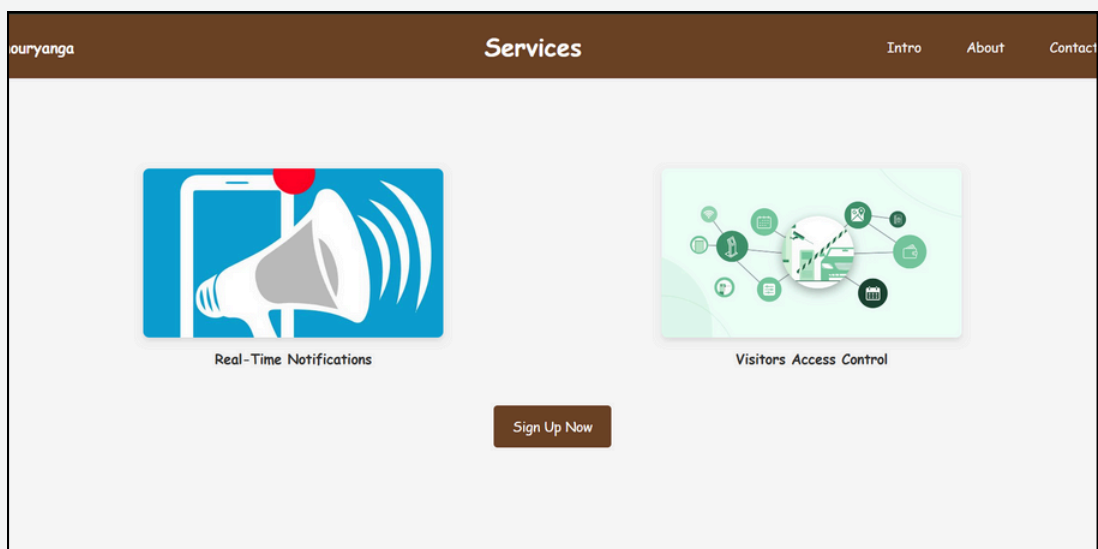
# PRA-VIGIL DOCUMENTATION



This is the about page



This is the contact page



# PRA-VIGIL DOCUMENTATION

Shouryanga **Make a Connection** [Intro](#) [About](#) [Contact](#)

Are you a Resident?

User Login

**Admin Registration**

Name:

Email:

Password:

Register Login

This page contain buttons for resident login for otp generation and new admin registration and a login button for already existing admins to login

Shouryanga **User Login** [Intro](#) [Contact](#) [About](#)

OTP for login: 479740

**Enter Your ID**

Enter your ID

Generate OTP

Your OTP: 479740

We need to enter the ID in the space if ID exists , OTP will be displayed as shown above. If not it displays a flash message as shown below.

Shouryanga **User Login** [Intro](#) [Contact](#) [About](#)

ID not found in the residents list.

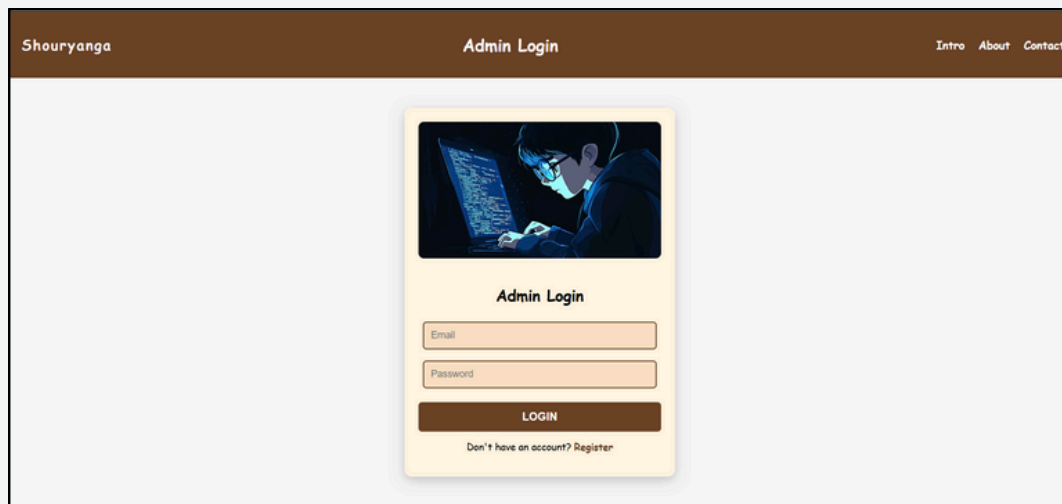
**Enter Your ID**

Enter your ID

Generate OTP

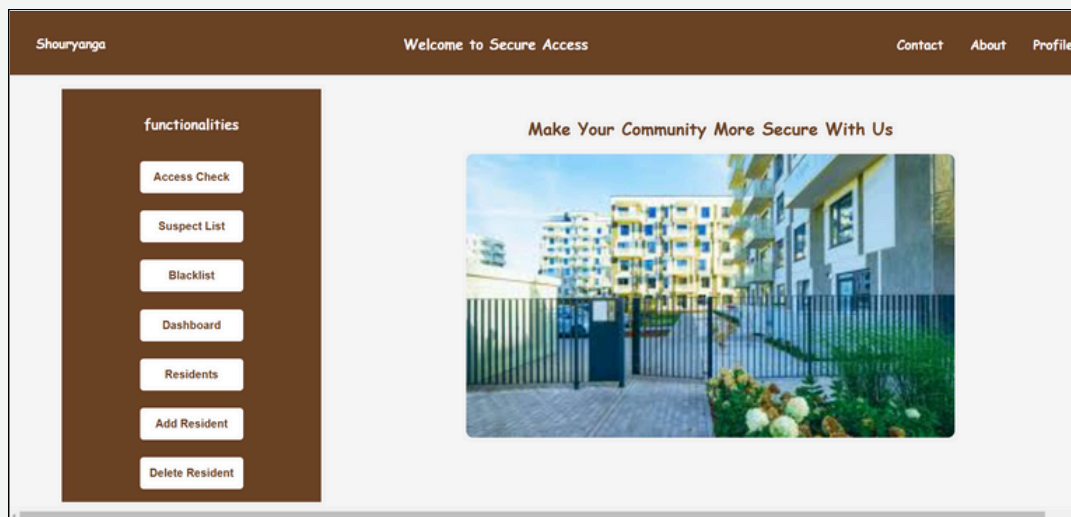


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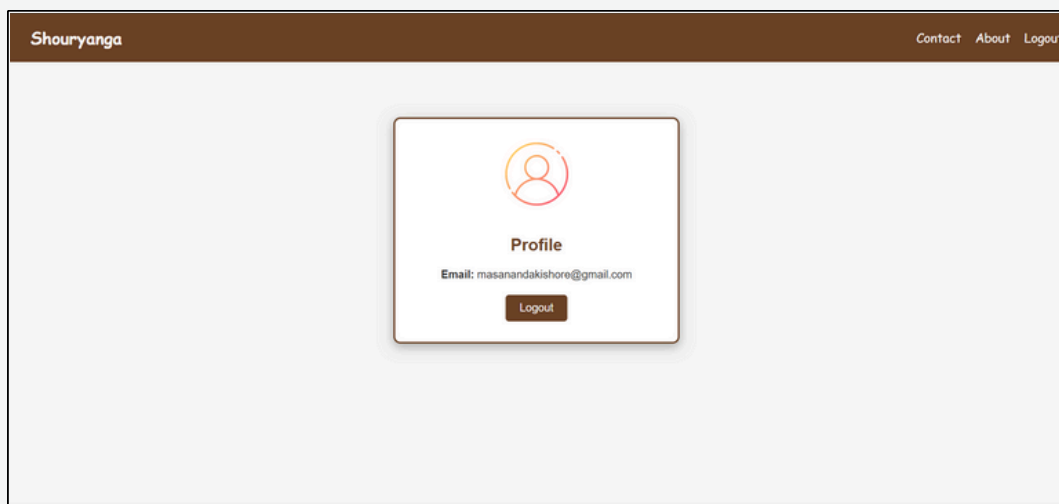
The screenshot shows the Admin Login page of the Shouryanga application. The header is dark brown with 'Shouryanga' on the left, 'Admin Login' in the center, and 'Intro About Contact' on the right. The main content area is white and features a central login form with a dark blue header image of a person at a laptop. The form includes fields for 'Email' and 'Password', a 'LOGIN' button, and a link for users who don't have an account to 'Register'.

Admin Login Page



The screenshot shows the Admin Home page. The header is dark brown with 'Shouryanga' on the left, 'Welcome to Secure Access' in the center, and 'Contact About Profile' on the right. The main content area is white. On the left, there is a dark brown sidebar with the heading 'functionalities' and a list of buttons: 'Access Check', 'Suspect List', 'Blacklist', 'Dashboard', 'Residents', 'Add Resident', and 'Delete Resident'. On the right, there is a large image of a modern building with a blue sky, and the text 'Make Your Community More Secure With Us' is displayed above it.

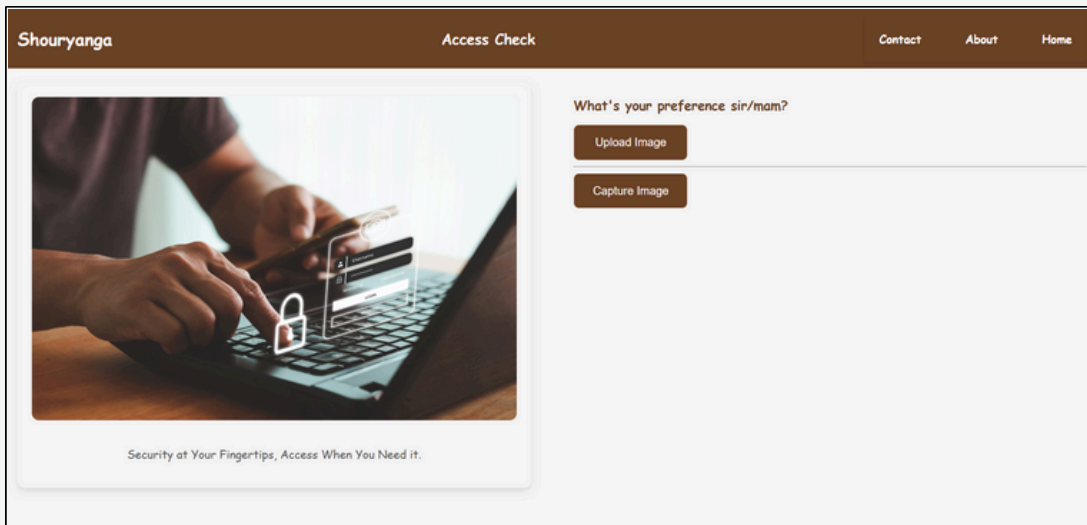
This is home page which only be displayed to admins



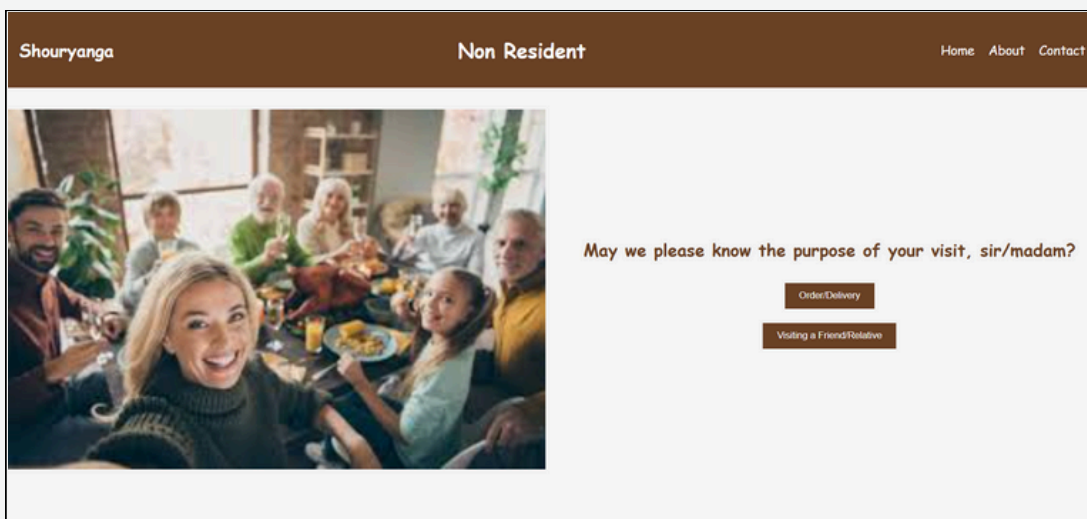
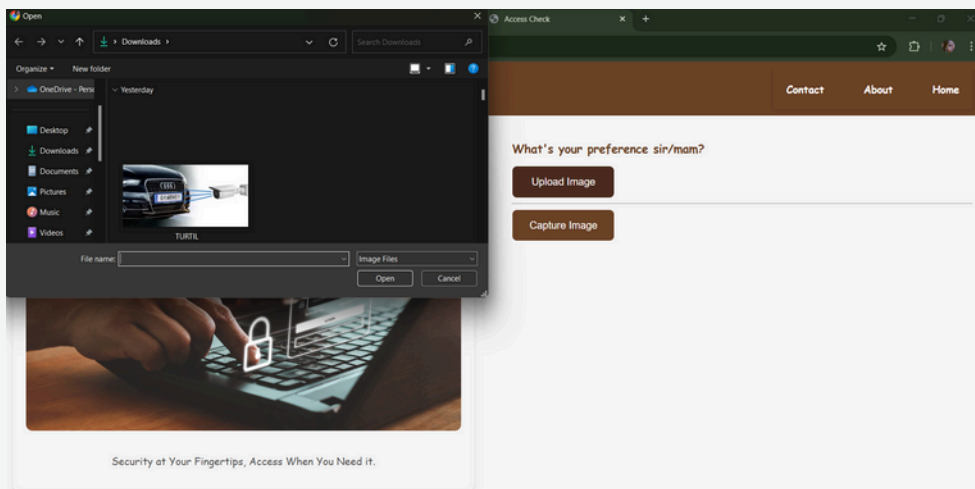
The screenshot shows the User Profile page. The header is dark brown with 'Shouryanga' on the left, 'Contact About Logout' on the right, and 'Profile' in the center. The main content area is white and features a central profile card with a circular profile picture placeholder, the text 'Profile', the email address 'Email: masanandakishore@gmail.com', and a 'Logout' button.

The session users email Id will be displayed here along with a logout button which redirects to admin login page.

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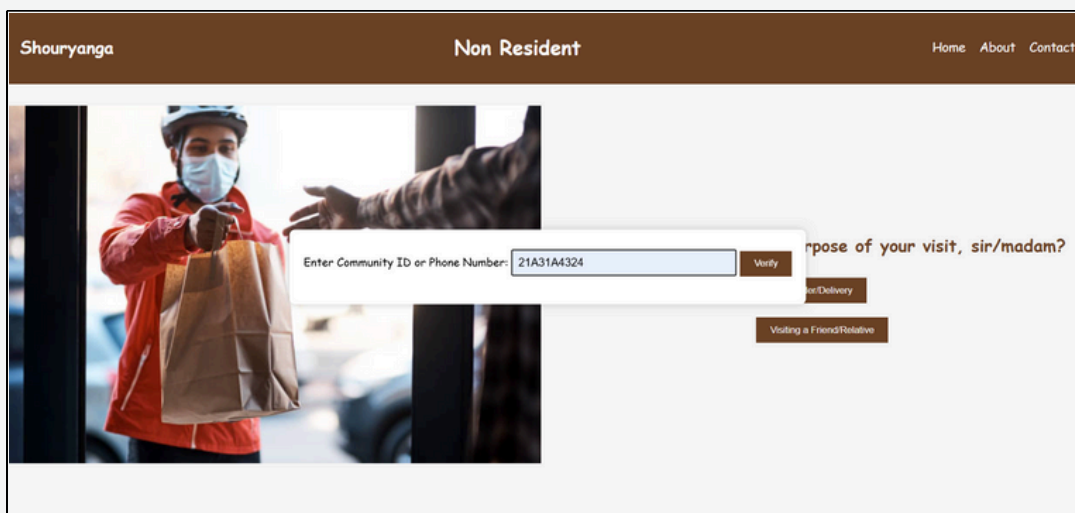
Upon clicking access check button we will be redirected to this page which asks for image upload or capture you need to have a webcam for capturing. only certain file extensions will be accepted here



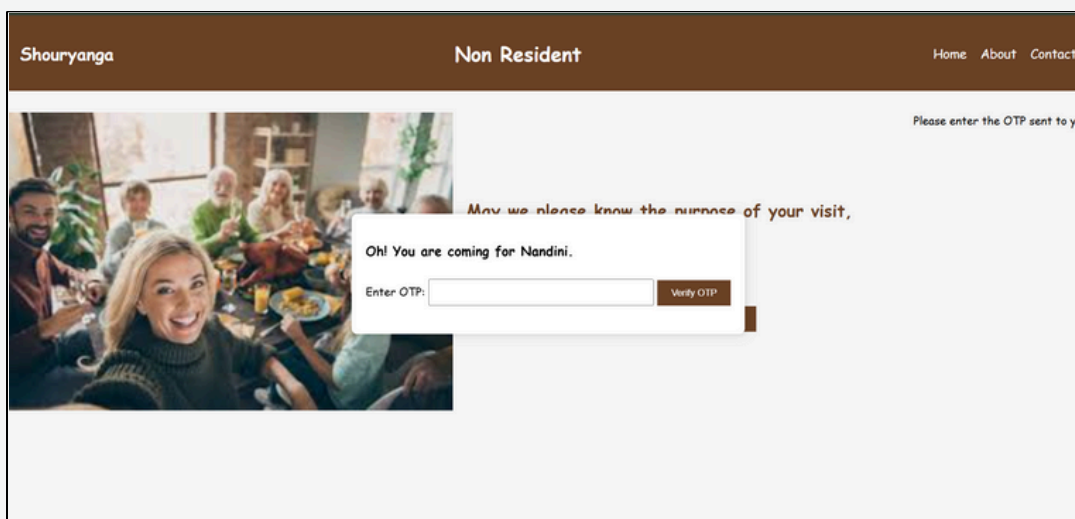
Incase the extracted vehicle no is not in residents and blocklist it will redirect to this page



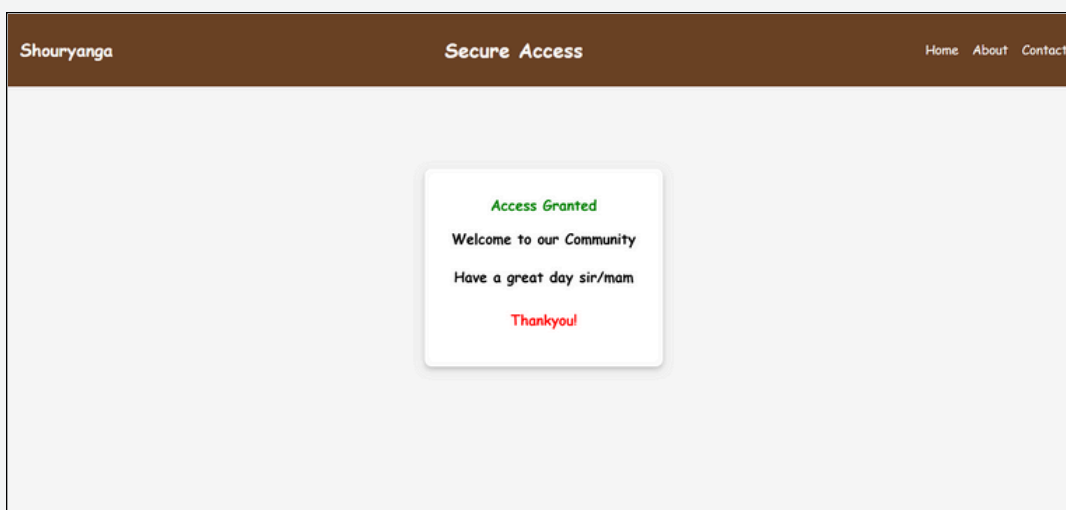
# PRA-VIGIL DOCUMENTATION



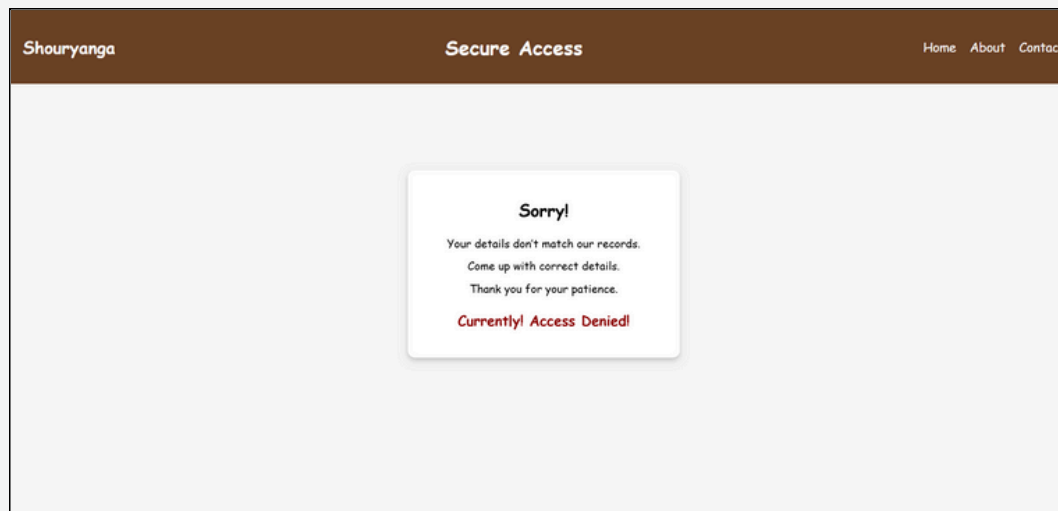
They should tell their purpose of visiting and community ID/phone number of resident they are visiting for to the admin he will verify



Here the visitors should ask the residents for otp which will be generated by them in the user login page for otp verification by communicating to the resident if otp matches then access will be granted and vehicle no will be added to access\_granted.csv.



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If OTP does not match access will be denied and vehicle no will be added to suspect list .  
If OTP failure is more than three times then the vehicle will be added to block list

The screenshot shows a web page titled 'Residents' with a header bar containing 'Shouryanga' on the left and 'Home About Contact' on the right. The main content area displays a table with the following data:

Vehicle_no	Name	Resident_id	Phone_no	Flat_no
AP0534241	NandaKishore	21A31A4351	9177755013	F101
AP0527485	Nandini	21A31A4324	9182138162	S201
AP0527486	Ramtej	21A31A4357	9849474389	F105
AP0511221	Santosh	21A31A4350	9030166923	F104
AP0544331	Sahithi	21A31A4333	9440464938	F102
AP0500111	Abhi	21A31A4301	9133773213	F103
AP0503331	Asha	21A31A43Q8	9392658385	S202
AP0555661	Usha	21A31A43Q6	6301687324	S203

Residents list

The screenshot shows a web page titled 'Suspect List' with a header bar containing 'Shouryanga' on the left and 'Home About Contact' on the right. The main content area displays a table with the following data:

Vehicle_no	Reason
AP0500111	Otp failurevehicle_no
IND22 BH6517	None

Suspect list

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Shouryanga

Block List

Home About Contact

Vehicle\_no

AP0527467

Block list

Shouryanga

Add Resident

Home About Contact

Enter Resident Details

Vehicle No

Name

SHOU197092

Generate ID

Phone No

Flat No

Update

To add new residents

Shouryanga

Delete Resident

Home About Contact

Resident

Suspect

Blocklist

Delete Entry

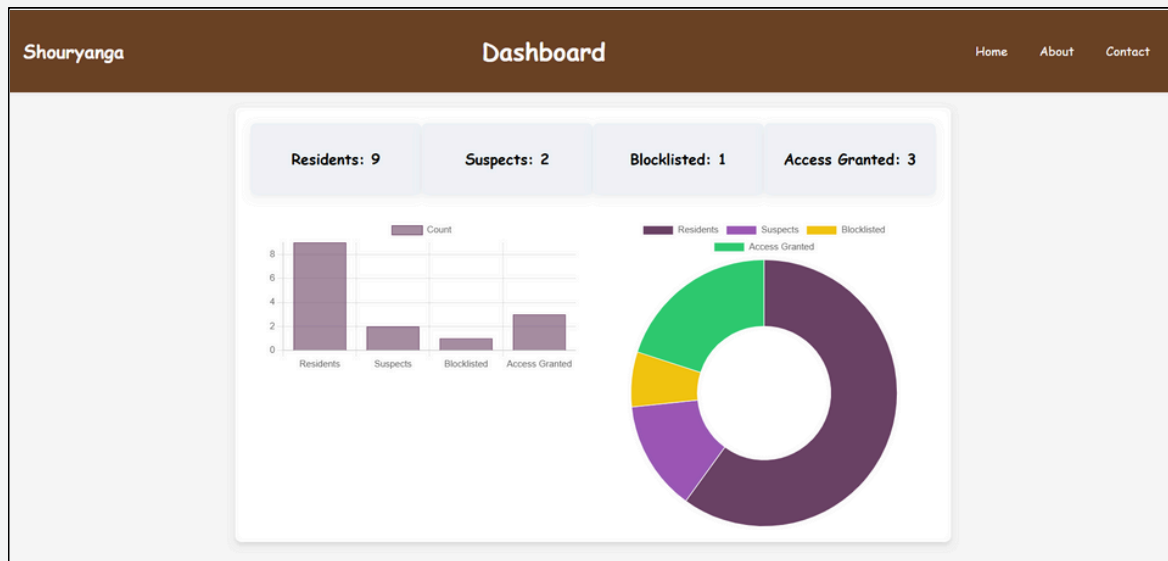
Enter Vehicle No

Delete

Cancel

To delete residents vehicle no from desired list

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Displays the statics of vehicle entries in a community

## SKILL SET USED:

- FLASK
- PYTHON
- DEEP LEARNING
- HTML
- CSS
- JAVA SCRIPT

## CONCLUSION:

I have done my project this way , in the journey of future advancements I want to integrate a Wifi camera which will auto clicks images , the procedure will be done by admin and access granted and denied pop ups will be connected to doors of community using Aurdino code to achieve this on fuller level.

In this regard I want to thank my faculty for helping me out in things and teaching me few logics and referred few online resources for better understanding of concepts and implementing few logics. I particularly didn't remember the names of websites to give credits. I used them for better understanding and I delivered this project.