

Automatic Number Plate Recognition (ANPR) System

Documentation

1. Overview

The ANPR System is a Python-based application designed to recognize vehicle number plates using a webcam or uploaded images. It allows users to detect number plates, fetch vehicle details, and manage records via an admin panel.

2. Features

- **Camera Integration:** Capture images using a webcam.
 - **Image Upload:** Upload an image for plate recognition.
 - **Automatic Plate Detection:** Extracts the number plate from an image.
 - **Vehicle Information Retrieval:** Fetch stored vehicle details.
 - **Admin Panel:** Allows authorized users to add vehicle records.
 - **Integration with M-Parivahan API:** Fetch vehicle details directly from the official VAHAN database.
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3. Technologies Used

- **Programming Language:** Python 3.x
 - **GUI Library:** Tkinter
 - **Image Processing:** OpenCV, PIL (Pillow)
 - **Data Handling:** SQLite (Future Implementation)
 - **API Integration:** M-Parivahan API / VAHAN API (Upcoming feature)
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4. Installation

4.1 Prerequisites

Ensure you have the following installed:

- Python 3.8+
- pip package manager

4.2 Install Required Dependencies

Run the following command:

```
pip install opencv-python numpy pillow tkinter requests
```

5. File Structure

ANPR/

```
| — main.py          # Main application file
| — detect_number.py # Number plate recognition logic
| — vehicle_db.py    # Vehicle database operations
| — vahan_api.py     # API integration for fetching vehicle details
| — icons/           # Icons for GUI buttons
| — uploads/         # Captured/uploaded images
| — background.jpg    # Background image
```

6. Functionality

6.1 Camera Capture

- Opens a camera window.
- Press **Spacebar** to capture an image.
- Press **Q** to close the camera.

6.2 Upload Image

- Select an image from your computer.

6.3 Detect Plate

- Runs recognition on the uploaded or captured image.
- Displays the detected plate number.

6.4 Fetch Details

- Enter a number plate manually.
- Retrieves stored vehicle data.

6.5 Admin Panel

- Secure login with a password.
- Add new vehicle details in a structured form.

6.6 Integration with M-Parivahan / VAHAN API

The **M-Parivahan API (VAHAN API)** allows us to fetch real-time vehicle details using the number plate. This API is managed by the **Ministry of Road Transport & Highways (MoRTH), Government of India**.

How to Integrate VAHAN API

1. **Register for API Access:** Visit the official **Parivahan Sewa website** to request API access.
2. **Obtain API Key:** After approval, you'll receive an **API Key** for authentication.
3. **Make API Requests:** Use the **requests** library in Python to fetch vehicle details.
4. **Parse JSON Data:** Extract relevant details like owner name, registration date, vehicle type, etc.

Example API Request:

```
import requests
```

```
API_KEY = "your_api_key_here"
```

```
NUMBER_PLATE = "MH12AB1234"
```

```
url = f"https://vahan.nic.in/api/vehicle-info?plate={NUMBER_PLATE}&apikey={API_KEY}"
```

```
response = requests.get(url)
```

```
data = response.json()
```

```
print(data) # Parsed vehicle details
```

Permissions Required for Integration

- **Government Authorization:** The VAHAN API requires official permission from MoRTH.
- **API Key:** Unique authentication token for making API calls.
- **Data Usage Agreement:** Ensure compliance with data privacy policies before integrating.

7. Future Enhancements

- **Database Integration:** Store vehicle details persistently.
- **Cloud Storage:** Sync images and data to a server.
- **Mobile App:** Develop an Android/iOS companion app.

8. Contributors

- **Lead Developer:** Tushar Sahu

For support, contact tusharsahu035@gmail.com.

LinkedIn : <https://www.linkedin.com/in/tusharsahu12/>

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