NUMBER PLATE PROJECT

INTRODUCTION:

The Number Plate Recognition (NPR) system, also known as Automatic Number Plate Recognition (ANPR), is a computer vision-based technology that automatically identifies and extracts vehicle license plate information from images or video frames. This project aims to design and implement a system that can detect and recognize vehicle number plates using image processing and optical character recognition (OCR) techniques. With the increasing need for smart traffic management, automated toll collection, and vehicle tracking systems, NPR has become an essential component in modern transportation and security infrastructures. The system integrates image acquisition, pre-processing, license plate detection, character segmentation, and recognition into a unified framework. This project showcases how artificial intelligence and machine learning can be leveraged to create efficient, real-time vehicle monitoring solutions.

ABSTRACTION:

The **Number Plate Recognition (NPR)** system is designed to automate the process of detecting and recognizing vehicle license plates from images or video streams. The core functionality of the system involves several key stages, each addressing a unique aspect of the problem:

1. **Image Acquisition**: The system first captures images or video frames from a camera installed at strategic locations like highways, toll booths, or parking lots.
2. **Pre-processing**: The captured images are pre-processed to enhance quality and remove noise. Techniques like grayscale conversion, image resizing, and histogram equalization are applied to standardize the input for the next stages.
3. **License Plate Detection**: Using computer vision algorithms (such as edge detection, contour analysis, and machine learning-based classifiers), the system locates the vehicle's license plate region within the image. This step focuses on accurately isolating the plate from the surrounding environment, even in challenging conditions like partial occlusion or low lighting.
4. **Character Segmentation**: Once the license plate is detected, the system segments individual characters (letters and numbers) from the plate, isolating each character for recognition.
5. **Character Recognition**: Optical Character Recognition (OCR) algorithms are applied to the segmented characters to recognize the alphanumeric sequence on the license plate. This involves comparing the segmented characters with a trained model or a predefined character set.
6. **Post-processing & Output**: The recognized license plate number is then validated, stored, or processed as per the system's requirement. The final output could be used for various applications, such as vehicle identification, access control, automated toll systems, or security monitoring.

The entire process is automated, aiming for real-time performance with high accuracy. Challenges such as variable lighting conditions, motion blur, and occlusions are addressed using robust image processing techniques, machine learning models, and post-processing filters to ensure accurate plate recognition.

### TYPES OF NUMBER PLATE:

### 1. Private Vehicle Plates

* **Standard for personal vehicles**
* Typically have white or light-colored background with black text
* Example: White background with black letters (India, UK)

**2. Commercial Vehicle Plates**

* Used for trucks, taxis, buses, delivery vehicles
* Often have a **yellow background with black letters** (e.g., India)
* Designed to indicate business use and often subject to different taxes and rules

**3. Government Vehicle Plates**

* Used by vehicles owned by government bodies
* Usually have **distinctive colors**, like **red or blue backgrounds**
* Example: Red plate with white letters (India); Green plate for government (Nigeria)

**4. Diplomatic Plates**

* Issued to embassies and diplomatic personnel
* Often have unique codes (like “CD” for "Corps Diplomatique")
* Background and text colors vary by country, e.g., blue plate with white letters

**5. Military Plates**

* For vehicles operated by the armed forces
* Unique format, often includes country code, service branch codes, or special logos
* Often have camouflage or matte finishes

**6. Temporary Plates**

* For new vehicles awaiting permanent registration
* Often made of paper or plastic, sometimes handwritten or printed
* Expire after a short time

**7. Dealer Plates**

* Used by vehicle dealers to move or test-drive unregistered vehicles
* Usually have special markings like “DLR” or a different color scheme

**8. Electric Vehicle Plates**

* In some countries, EVs have distinctive plates (e.g., green stripe or background)
* Helps identify eco-friendly vehicles for incentives or restricted zones

**9. Personalized or Vanity Plates**

* Custom number/letter combinations chosen by the owner
* Often comes at a premium cost

**10. Vintage or Historic Vehicle Plates**

* For classic or antique cars
* Often a unique color or design to reflect the vehicle’s heritage status

STANDARED NUMBER PLATE FOMATE:

**🇮🇳 India (Standard Format)**

Format: XX 00 XX 0000

* XX – State/Union Territory code (e.g., **MH** for Maharashtra)
* 00 – District code (RTO code)
* XX – Series code (letters)
* 0000 – Unique vehicle number (1 to 9999)

**Example:** MH 12 AB 1234

**🇬🇧 United Kingdom**

Format (post-2001): AA00 AAA

* AA – Regional identifier
* 00 – Age identifier (year and half-year of registration)
* AAA – Random letters

**Example:** AB12 XYZ

**🇺🇸 United States**

No nationwide format – each **state** has its own format and design. Example from **California**:

**Example:** 7ABC123 (random letters and numbers)

**🇩🇪 Germany**

Format: X-XX 1234

* X – City/district code (e.g., **B** for Berlin)
* XX – 1-2 letters
* 1234 – Up to 4 digits

**Example:** B-MB 1234

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### ****Custom and Fancy Number Plates****

**Custom or fancy number plates** are specially chosen registration numbers that are often easy to remember, visually appealing, or have personal/brand significance. Here's how they generally work in different regions:

## 🇮🇳 **India**

### Allowed:

* VIP numbers (e.g., 0001, 9999, 1234)
* Mirror numbers (e.g., 1221, 2112)
* Repetitive digits (e.g., 1111, 2222)
* Custom series (if permitted by RTO) How to Get One:
* **Auction or direct allotment** by the **RTO (Regional Transport Office)**
* Pay a **premium fee**, which varies by state and number (can range from ₹5,000 to ₹5+ lakh)
* Apply online in some states (e.g., Maharashtra, Delhi, Gujarat)

### Rules:

* Cannot tamper with the format (e.g., spacing, fonts)
* No religious or offensive content
* Cannot mimic government or defense numbers

## 🇬🇧 **United Kingdom**

* Personalised plates via **DVLA auctions** or private sellers.
* Prices range from £250 to £500,000+ depending on rarity.
* Example: J0HN, M1KEY, L0VE U

## 🇺🇸 **United States**

* Each **state DMV** allows vanity plates.
* You choose words/numbers (within 7–8 character limit).
* Subject to approval (no offensive language).
* Fees range from $25–$100+/year.
* Example: ILUVNY, EV 4ME, CEO123

### Fancy Plate Appearance (Design & Styling)

In **many countries**, altering the **font, color, or design** of a number plate (to make it look "fancy") is **illegal**. However:

* In **India**, high-security registration plates (HSRP) are mandatory.
* Decorative plates are allowed only for display purposes (e.g., inside the car), not for legal use.

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## 🇮🇳 **How to Apply for a Number Plate in India**

### For ****New Vehicles**** (Dealer-Assisted)

1. **Buy a new vehicle** – The dealer typically handles the registration.
2. **Submit documents**:
   * Form 20 (application for registration)
   * Form 21 (sales certificate)
   * Form 22 (roadworthiness certificate)
   * Insurance copy
   * Address proof (Aadhaar, utility bill, etc.)
   * ID proof
   * PAN card (or Form 60)
3. **Pay registration fee** – Includes:
   * RTO registration fee
   * Road tax
   * Fee for HSRP (High-Security Registration Plate)
4. **Receive RC** (Registration Certificate) and number plate – You get a **temporary registration**, followed by the permanent number in a few days.

### For ****Fancy/VIP Numbers****

1. **Visit your state's transport department website**
   * Examples:
     + Maharashtra: https://fancy.parivahan.gov.in/fancy/
     + Delhi: https://transport.delhi.gov.in
2. **Register and login** to the portal.
3. **Check available numbers** – Search or browse VIP numbers.
4. **Bid in auction** (if applicable) or pay the premium fee directly.
5. **Make payment** online.
6. **Get allotment confirmation** – This number can be used during vehicle registration.

### For ****Replacing a Lost/Damaged Number Plate****

1. Visit the **RTO** where your vehicle is registered.
2. File an **FIR** if lost.
3. Submit:
   * FIR copy
   * Vehicle RC
   * Insurance
   * ID proof
4. Pay fee and request a **replacement HSRP**.

### High-Security Number Plates (HSRP)

Now **mandatory** in most states for all vehicles.

#### How to apply online:

1. Visit: <https://bookmyhsrp.com/> (for many states)
2. Select your **vehicle type, state, and RTO**.
3. Enter **RC details and vehicle info**.
4. Choose **fitment location and slot**.
5. Pay online and get appointment confirmation.

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def apply\_number\_plate():

print("=== Number Plate Application Form ===\n")

owner\_name = input("Enter owner's full name: ")

vehicle\_type = input("Enter vehicle type (e.g., Car, Bike): ")

vehicle\_make = input("Enter vehicle make (e.g., Honda, Tata): ")

vehicle\_model = input("Enter vehicle model: ")

chassis\_number = input("Enter chassis number: ")

engine\_number = input("Enter engine number: ")

rto\_code = input("Enter RTO code (e.g., MH12): ")

preferred\_number = input("Enter preferred number (leave blank for random): ")

print("\n--- Submitting Application ---")

print("Owner:", owner\_name)

print("Vehicle:", vehicle\_make, vehicle\_model, f"({vehicle\_type})")

print("Chassis No.:", chassis\_number)

print("Engine No.:", engine\_number)

print("RTO Code:", rto\_code)

if preferred\_number:

print("Preferred Number:", preferred\_number, "(subject to availability)")

else:

print("Number: Randomly assigned by RTO")

print("\n Application submitted successfully!")

print("Note: Please visit your nearest RTO or state portal to complete the process.\n")

def fetch\_violation\_details(vehicle\_number):

# Simulated database of violations

violations = {

"MH12AB1234": {"violation": "Over speeding", "amount": 1000},

"DL01CD5678": {"violation": "Signal Jump", "amount": 500},

"KA05EF4321": {"violation": "No Helmet", "amount": 200},

}

return violations.get(vehicle\_number.upper(), None)

def process\_payment(amount):

print(f"\nProcessing payment of ₹{amount}...")

card\_number = input("Enter card number (XXXX-XXXX-XXXX-1234): ")

expiry = input("Enter expiry date (MM/YY): ")

cvv = input("Enter CVV: ")

print(" Payment successful! Thank you for clearing your challan.")

def main():

print("=== Traffic Violation e-Challan Payment ===")

vehicle\_number = input("Enter your vehicle number (e.g., MH12AB1234): ")

## 🇮🇳 **Fines and Penalties for Number Plate Violations (India)**

### Common Number Plate Violations:

| **Violation Type** | **Example** | **Penalty (as per MV Act, 2019)** |
| --- | --- | --- |
| No number plate | Blank plate or missing plate | ₹5,000 (first offense), ₹10,000 (repeat) |
| Fancy/Unauthorized fonts or styles | Cursive, graffiti, italics | ₹5,000 |
| Wrong color combination | e.g., white on white for private car | ₹5,000 |
| Tampered or fake number plate | Misrepresentation or duplicate | ₹5,000–₹10,000 + legal action |
| Misuse of temporary registration plate | Using temp plate beyond validity | ₹2,000 |
| Not using HSRP (High Security Plate) | Especially for older vehicles | ₹5,000 |
| Covered or hidden number plate | Dirt, accessories, or stickers | ₹500–₹1,000 |

### Legal Plate Requirements:

* **White plate with black letters** → Private vehicle
* **Yellow plate with black letters** → Commercial vehicle
* **Red plate with white letters** → Temporary registration
* **HSRP (High-Security Registration Plate)** → Mandatory for most vehicle

Repeat offenders may face **vehicle seizure** or **RC suspension**.

* Some states allow you to pay fines online via the **Parivahan e-challan portal**: https://echallan.parivahan.gov.in

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details = fetch\_violation\_details(vehicle\_number)

if details:

print(f"\nViolation: {details['violation']}")

print(f"Fine Amount: ₹{details['amount']}")

confirm = input("Do you want to proceed with payment? (yes/no): ")

if confirm.lower() == "yes":

process\_payment(details["amount"])

else:

print(" Payment cancelled.")

else:

print(" No pending violations for this vehicle.")

if \_\_name\_\_ == "\_\_main\_\_":

main()

**SAMPLE OUTPUT**

Traffic Violation e-Challan Payment

Enter your vehicle number (e.g., MH12AB1234): MH12AB1234

Violation: Over speeding

Fine Amount: ₹1000

Do you want to proceed with payment? (yes/no): yes

Processing payment of ₹1000...

Enter card number (XXXX-XXXX-XXXX-1234): 1234-5678-9876-5432

Enter expiry date (MM/YY): 12/26

Enter CVV: 123

Payment successful! Thank you for clearing your challan.

**NO PENDING VIOLATION**

Traffic Violation e-Challan Payment

Enter your vehicle number (e.g., MH12AB1234): RJ14XY0000

No pending violations for this vehicle.

**Conclusion:**

Number plates are a crucial part of vehicle identification and law enforcement. In India, the Motor Vehicles Act mandates strict guidelines regarding the **design, format, and legality of number plates**, including the **use of High-Security Registration Plates (HSRP)**.

Violations such as **fancy fonts**, **missing or tampered plates**, or using **incorrect color schemes** can result in heavy fines—ranging from ₹500 to ₹10,000—along with possible legal action. The government has enabled **online payment systems** like **e-challan portals** to make fine payments more transparent and efficient.

Following proper number plate rules not only avoids penalties but also ensures road safety, helps in crime detection, and supports smooth enforcement of traffic laws.

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