



# Number Plate Detection System

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# About our Project



- ANPR is an image -processing technology which is used to identify vehicles by their number plates using Optical Character Recognition.
- This technology is used in various security and traffic applications such as access-control system.



Number plate recognition system(NPRS) uses optical character recognition(OCR) on images taken by cameras. In certain countries, number plate switched to a different style, one of the changes made was to the FONT, introducing small gaps in some letters(such as P and R) to make them more distinct and therefore more legible to such systems. Some license plate arrangements use variations in font sizes and positioning- NPRS systems must be able to cope with such differences in order to be truly effective. More complicated systems can cope with international variants, though many programs are individually tailored to each country.

The cameras used can be existing road-rule enforcement or closed-circuit television cameras, as well as mobile units, which are usually attached to vehicles. Some systems use infrared cameras to take a clear image of the plates

# Why this project?



- We know India is the second most populous country with approximately one billion people.
- So there are multiple uses of NPRS like in highways monitoring, parking management, neighbourhood law enforcement security etc.,

There is one death in every four minutes in India with most of them occurring due to over speeding. NPRS is used to monitor the vehicles average speed and can identify the vehicles that exceed the speed limit. In this case, a fine ticket can be automatically generated by calculating the distance between two cameras. This helps to maintain law and order which, in turn, can minimize the number of road casualties.

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# Why this project?

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In India 2,00,000 cars are stolen per year. This number can lessen if proper steps are taken and NPRS system is used to track cars so that if vehicles are stolen, law enforcement will be able to identify when, where and the route taken by a stolen vehicle. This can help bring justice swiftly to such a vast nation.



# Objectives

- To detect the number plate of the vehicle as accurately as possible
- To use the least cost approach and provide an effective solution to monitor vehicle activities
- To try and implement the project at our university for better tracking and security purpose.



# Various names of this technology are:

- Number Plate Recognition System (NPRS)
- License Plate Recognition(LPR)
- Car Registration System(CRS)
- Intelligent Transport System(ITS)



# STUDY OF EXISTING SYSTEM

Automatic number-plate recognition is a technology that uses optical character recognition on images to read vehicle registration plates to create vehicle location data. The existing systems use very costly infrared cameras that allows them to detect the number plate. Due to these cameras the cost of the set-up increases thus it is not easy for every society and school colleges to use this system.



# What's Different in our Project?

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- Digital Era
  - Less Human Supervision
  - More secure surroundings
  - Cheaper than existing Sysytems.
  - Details of the car owner.

# IMPLEMENTATION



## 3 Major Steps

*DETECTION OF  
VEHICLE*

*CAPTURE OF  
IMAGE*

*PROCESS OF  
RECOGNITION*



## DETECTION PROCESS

- The vehicle approaches the secured area and the process starts when the vehicle steps over a magnetic loop detector.
- The loop detector senses the car and it's presence is signaled to the ANPR unit.





## CAPTURE OF IMAGE

- The ANPR unit activates the illumination and takes pictures of the front and rear plates using ANPR camera.
- The images of the vehicle is read by the ANPR unit's image processing hardware or the frame grabber.





## PROCESS OF RECOGNITION

- The ANPR unit analyzes the image with different image processing software.
- The ANPR unit checks if the vehicle appears on a predefined list of authorized cars and if found it signals to open the gate by activating its relay.
- OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision.



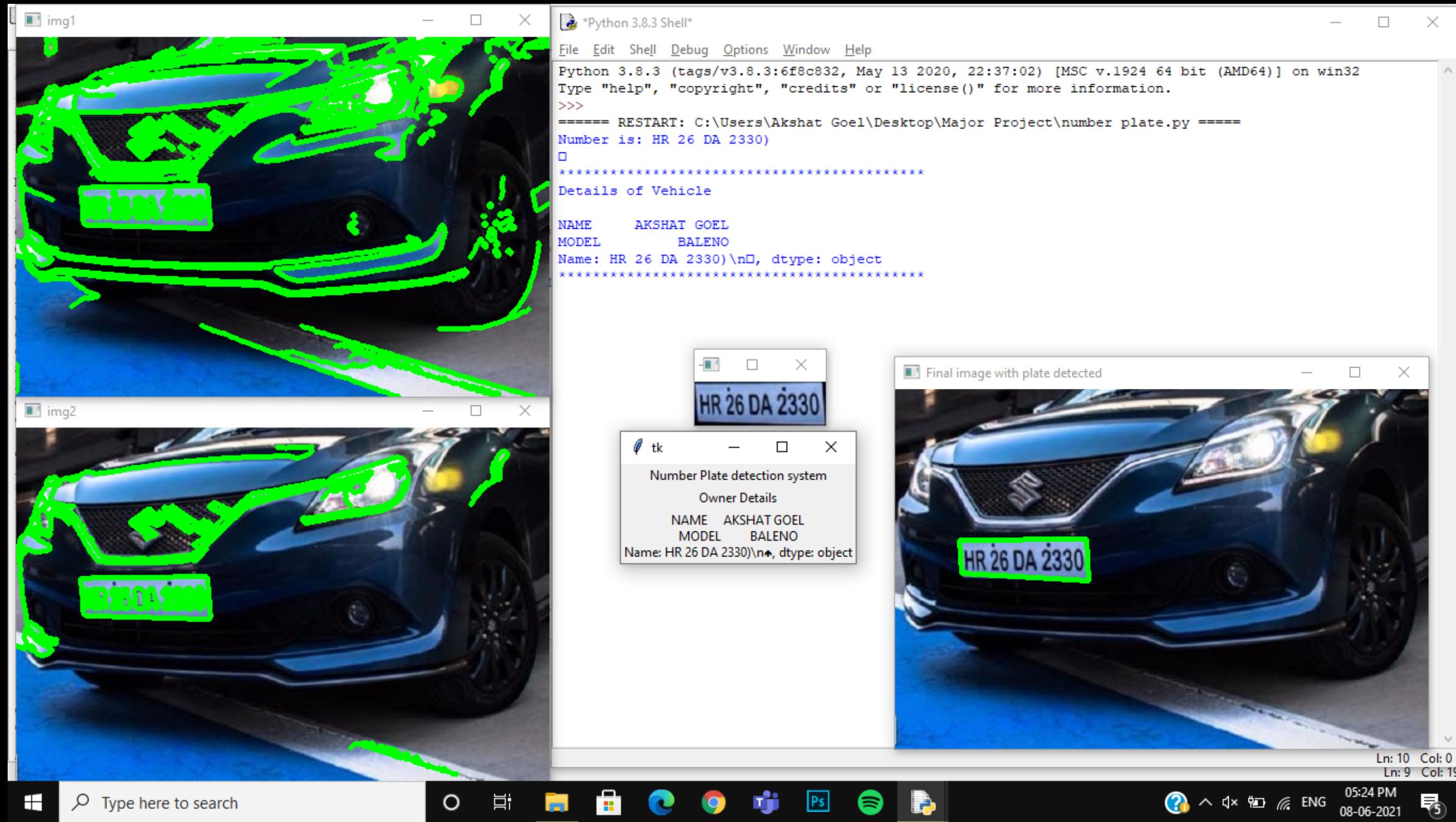


## PROCESS OF RECOGNITION

- The authorized vehicle enters the secured area and after passing the gate it's detector closes the gate.
- The system waits for the next vehicle to approach the secured area.



# FINAL OUTPUT



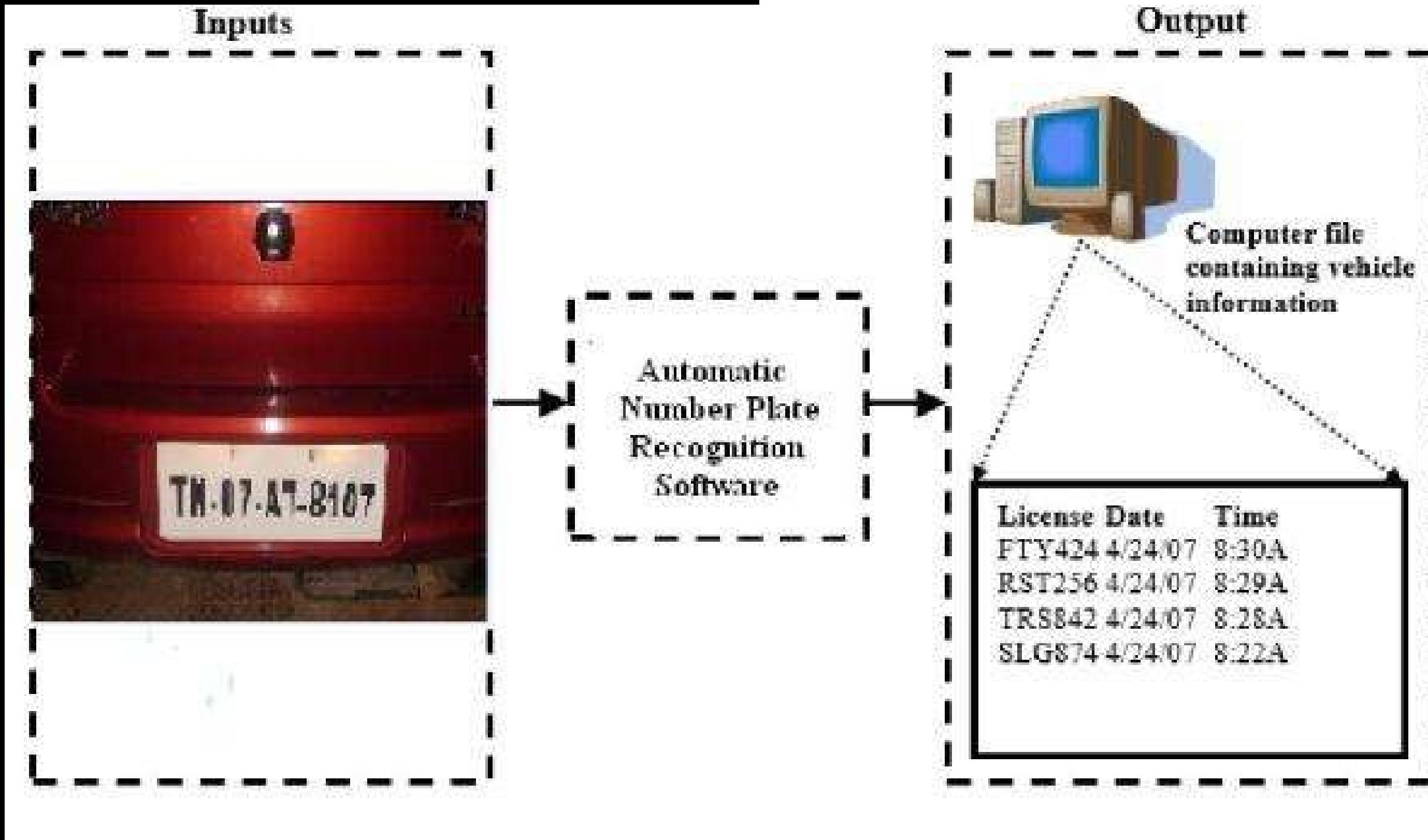
# ANTICIPATED PROBLEMS

Identifying difference between some letters  
(such as P and R)

variations in font sizes and positioning  
Blurry images, particularly motion blur

Poor lighting and low contrast due to overexposure, reflection or shadows

# Automatic Number Plate Recognition



# ADVANTAGES

- ▶ improving road safety.
- ▶ reduces crime.
- ▶ gives officers better information to work with.
- ▶ deterring terrorism.
- ▶ giving a greater police presence.
- ▶ increasing the percentage of stop/searches that lead to an arrest.
- ▶ pre-paid parking members can be easily differentiated from non-members.

# DISADVANTAGES

- Firstly, the images of the number plate or of any object which is taken by using the optical character reader technology may get blurred mainly due to the reason of motion blurring for which the picture seems to be hazy when uploaded in the database.
- Secondly, the technology often uses low-resolution images for which the images are not actually visible properly in every case.

# APPLICATIONS

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## Parking

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The plate number is used to automatically enter pre-paid members and calculate parking fee for non-members (by comparing the exit and entry times).

In this example, a car is entering a car park in a busy shopping center. The car plate is recognized and stored. When the car will later exit (through the gate on the right side) the car plate will be read again. The driver will be charged for the duration of the parking. The gate will automatically open after payment - or if the vehicle has a monthly permit.

# APPLICATIONS

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## Access Control

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A gate automatically opens for authorized members in a secured area, thus replacing or assisting the security guard. The events are logged on a database and could be used to search the history of events.

In this example, the gate has just been automatically raised for the authorized vehicle, after being recognized by the system. A large outdoor display greets the driver. The event (result, time and image) is logged in the database.

# APPLICATIONS

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## Tolling

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The car number is used to calculate the travel fee in a toll-road, or used to double-check the ticket.

the plate is read when the vehicle enters the toll lane and presents a pass card. The information of the vehicle is retrieved from the database and compared against the pass information. In case of fraud the operator is notified.

# APPLICATIONS

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## Stolen Cars

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A list of stolen cars or unpaid fines is used to alert on a passing

The 'black list' can be updated in real time and provide immediate alarm to the police force. The NPRS system is deployed on the roadside, and performs a real-time match between the passing cars and the list. When a match is found a siren or display is activated and the police officer is notified with the detected car and the reasons for stopping the car.

# APPLICATIONS

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## Enforcement

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Enforcement - the plate number is used to produce a violation fine on red-light systems. The manual process of preparing a violation fine is replaced by an automated process which reduces the overhead and turnaround time. The fines can be viewed and paid on-line.

# APPLICATIONS

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## Journey Time Management

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A number of NPRS units are installed in different locations in city routes and the passing vehicle plate numbers are matched between the points. The average speed and travel time between these points can be calculated and presented in order to monitor municipal traffic loads. Additionally, the average speed may be used to issue a speeding ticket.

In this example the car is recognized at two points, and the violation shows the photos of both locations which were taken on bridges on top of the highway. The average speed of the car is calculated from both points, and displayed if the speed passed a violation threshold, and optionally printed.

Thank You

