# The Recognition and Detection System for Theft Vehicle by Number Plates

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**Abstract:** *Large number of vehicles creates various problems and disturbances in day to day life. Vehicles generate problems of heavy traffic on road and stealing of vehicles at the parking areas. Management of vehicles and transportation are tedious and time consuming task. If it is completely operated by manually that reflects huge errors and difficulties. Therefore, it is necessary to develop automatic recognition and detection of the number plate of vehicles by recognition system. This paper shades light on the said problem. Recognition system will automatically detect the front number plate of vehicles. The detected number plate follows subsequent steps: 1.To capture image of number plate 2. To segment and recognize characters.3.Recognised license plate displays on graphical user interface and stored in database with time and date for further use 4.If stolen vehicle is detected alarm will ring and send SMS to the police station. The system can be used for the purpose of security and accuracy. It will be beneficial to reduce the problem such as recognize automatic high speed on highway, traffic violation cases, to collect toll automatically on toll plazas and to make security in parking areas.*

**Keywords:** Automatic vehicle license recognition system, Character segmentation, Character recognition, stolen vehicle, Theft detection.

## 1. Introduction

Vehicles are increasing enormously in today's era. It is necessary to travel from one place to another place in stipulated time. We see, numbers of vehicles are around us. Everyone needs vehicles for different purpose. In the proportion of population, vehicles increase enormously since last two decades. But, it creates tubule and difficulty for human life. It engenders problems of huge traffic, large sound, crime cases for instance stealing of vehicles and accidents etc. Therefore, management and administration of vehicle is very necessary to avoid said problems of society. As a result, there is a lot of efforts are taken to improve the difficulties in transportation of vehicles. Out of these, vehicle Plate Recognition System is the most attractive research issue to latest researcher. Thus, this manuscript discusses on some practical aspect of recognizing number written on vehicle number plate. A Vehicle Plate Recognition System is a tracking system that identifies the vehicle, so that, the vehicle is tracks down through the existing database. Normally the recognition system will be installed at the gate of the residential area, factory entrances Parking space, toll gates, university entrance or other high-secured building such as defense institute, nuclear factories as given in [1].
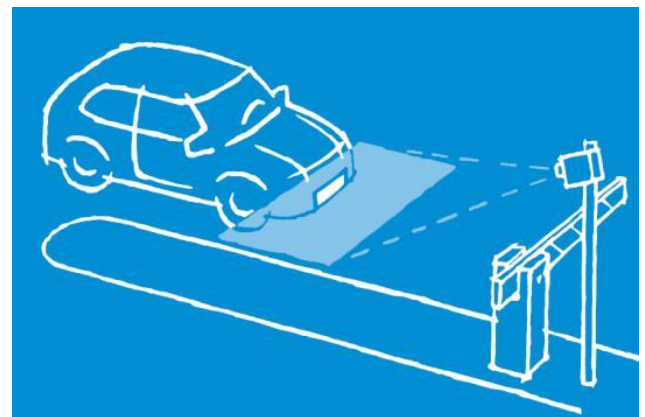


**Figure 1:** Architecture of the Proposed System

Above Fig.1 describes the more details of Vehicle Plate Recognition system thoroughly. The presence of vehicle reflects camera. It captures image of vehicle which will be used for further processing. Basically, vehicle registration plate is a plate which is made by either metal or plastic and is usually will be attached to the front or back of a vehicle. Vehicle plate number contains of numbers and alphabetical letter which can be used to represent an identity of respective vehicle as described in [2].

The first two letter of the vehicle serves as the state location prefix and followed by two numerical digits which represents district from where vehicle belongs to. Number plate format of Indian vehicle is LLNN LLNNNN where L is letter and N is the number. If vehicles are recognized manually then will be more mistakes with less efficiency and slow. If the described system will be implemented artificially by using machines described in next chapter, it will be more efficient and Less Costly. Each License plate has a unique number assigned to it for vehicle identification. The main challenge while working with ALPR is the

Accuracy and Detection speed ie. ALPR produces correct output within certain amount of time which is the prime necessity of ALPR. This can be obtained with quality of Algorithms used in a License Plate Detection. The distance between the camera and the vehicle should be approximately constant. For license plate detection purpose the concept of edge detection, contour determination and bounding box formation and elimination is used. Selection of license plate areas (LPA) and their elimination to obtain the actual license plate was based on various heuristics. This stage is important since improper detection of LPA can lead to misrecognized characters.

## 2. Literature Survey

Huge work is done on Vehicle License plate Recognition System in various industries. Large numbers of research papers also are published by various authors in IEEE journals, non IEEE journal and dissertation report. Some basic references which are referred by authors are discussed in following sections.

1. Christos Nikolaos E. Vassili Loumos ,Anagnostopoulos, Ioannis E. Anagnostopoulos, ,and Eleftherios Kayafas- A License Plate Recognition. Algorithm for Intelligent Transportation System Applications IEEE transaction on Intelligent Transportation System, Vol. 8, No. 3, Sept 2006.

In this paper, a new algorithm for vehicle license plate identification is proposed of using segmentation technique and connected component analysis in conjunction with a character recognition. The algorithm was verified with different gray-level vehicle images of different backgrounds and ambient illumination. While, the camera captures the number plate, the angle and the distance of the vehicle should be according to the experimental setup.

2. Choudhury A. Rahman, Wael Badawy,Ahmad Radmanesh A Real Time Vehicle.s License Plate Recognition System Proceedings of the IEEE Conference on Advanced Video and Signal Based Surveillance,0- 7695-1971.June 2010.

A smart and simple algorithm is presented in this paper for vehicles license plate recognition system. Depend on pattern comparison; this algorithm can be applied for real time detection of license plates for collecting data for surveying or for some application specific purposes. The system has been designed using C++ and the experimental results have been shown for recognition of Alberta license plates. Extraction of Characters and finally recognition of each character to form a string to match with the registered License plate numbers.

## 3. Related Work

### A. Phases of ANPR
ANPR system work according to the given phases:
1) Obtain image
2) License Plate Separation
3) License Plate Segmentation 4.Number Identification
4) License Plate Recognition
5) Character Extraction from Plate

6) Showing Document of the extracted

As shown in (Fig 2), Image need to be captured first and the image should not be blurred so that system should be able to do necessary processing on image for number identification. Then the license plate needs to be extracted from the whole image. Segmentation is performed on extracted image. Through Segmentation the extracted image is divided into many segments for further processing. Noise needs to be removed from the image for proper number identification. The final phase of Automatic Number Plate Recognition (ANPR) is Number identification.
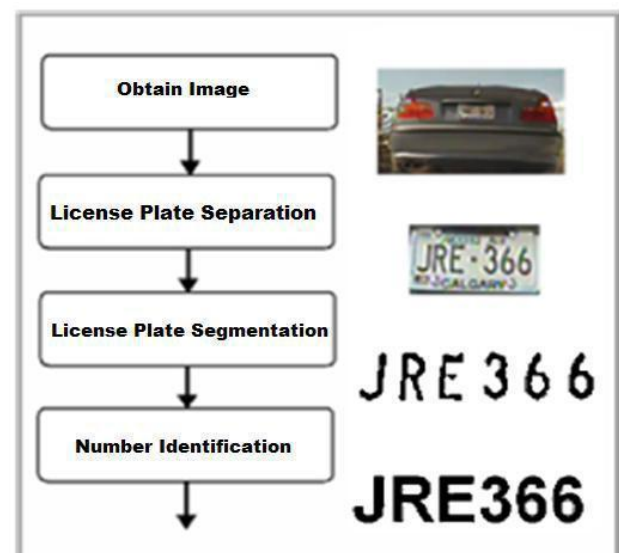


**Figure 2:** Phases of ANPR

3. Banshidhar Majhi Heuristics for license plate localization and hardware implementation of Automatic License Plate Recognition (ALPR) systemDepartment of Computer Science and Engg, National Institute of Technology Rourkela, 2012.

The project Heuristics for license plate localization and hardware implementation of Automatic License Plate Recognition (ALPR) system deals with detection and recognition of license plate from a captured front view of any car. The work obeys all the steps in an ALPR system like pre-processing, segmentation, and license plate localization,

### B. Working of ANPR

#### 1. Input a raw image:
It captures the image from a digital Camera. The resolution of camera needs to be good so that the captured image can be further utilizes for processing; Captured image is given to the ANPR as input.

#### 2. Converting image into Grey Scale
Grey scale conversion is nothing but converting an image into black and white view with grey shades. Colored images don't help us to identify the important edges and other features. So,the image needs to be converted in Grey scale format.

### 3. Binarization

Thresholding method is used to convert the grey scale image to monochrome. This method reduces the complexity of captured image (input).

### 4. Morphological operation:

It performs operation on grey scale image .This operation starts with the dilation of an image. Then, erosion needs to be performed after that by applying median filtering noise can be used.

### 5. License Plate Recognition:

The main step is to detect the size of the license plate. In general the shape of the License Plate is rectangular. The edges of rectangular area need to be finding first. Depending upon the Threshold value of an input image, edges can be detected. Hence, the whole license plate can be recognized.

### 6. Character Extraction from License Plate:

OCR(optical character recognition) Algorithm is used for Character Extraction.

### 7. Showing document of the extracted:

Search and display the details of extracted number of License plate on micro computer unit.

## 4. Proposed System

The system includes a hardware module and a software module. Hardware module includes image acquisition system, sensor, alarm and relay. Image acquisition is done using a digital camera. Software module includes image processing. Image processing involves Number detection and Number recognition. Block diagram of entire system is shown in Fig 3.
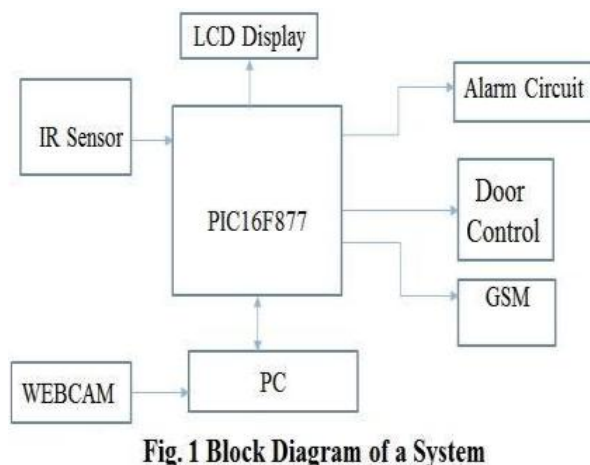


**Fig. 1 Block Diagram of a System**

## 5. Proposed System

When, a vehicle appears in the toll plaza. It will be stopped by the gate and the image of that vehicle will captured by the camera. The camera sends the image of appeared vehicle to microcomputer unit. It extracts number plate and segmented characters. It also recognizes the getting information with help of MATLAB software. It is software that used for image processing. After that, MATLAB recognizes the

number plate and it will be compared with the database of missing vehicle that is provided by police station for the stolen vehicles. The number plate of captured vehicle is compared with information of stolen vehicle that is provided by police station. When, a vehicle moves toward the gate. The vehicle becomes obstacle for IR sensor. If appeared vehicle is stolen according to database. The gate will not open for stolen vehicle. At the same time, the alarm rings and sends a message to police station as well as it also displays on LCD of toll plaza. All above said functions are done by PIC microcontroller (16f877a). In the contrast, if the captured image of vehicle will not match and exist in the database, the door will open and buzzer does not make sound or ringing. In this way, vehicle after vehicle successfully detection is going 24 hours on toll plaza.

## 6. Experimental Results

We have taken number of photos of cars by camera. It has done survey to know what be the exact position of number plate in total image. The image is shown in Fig.4.
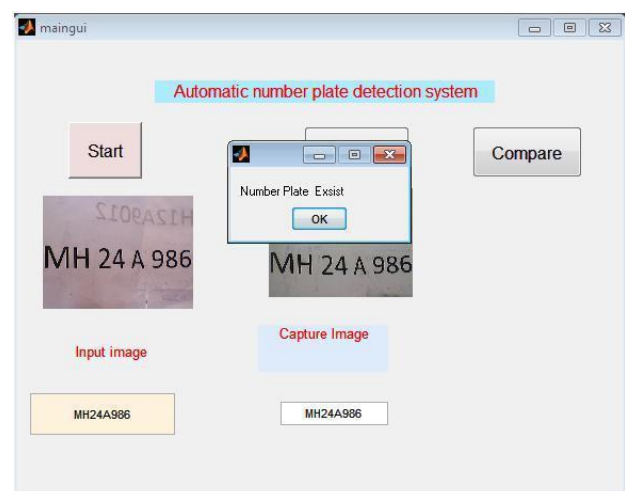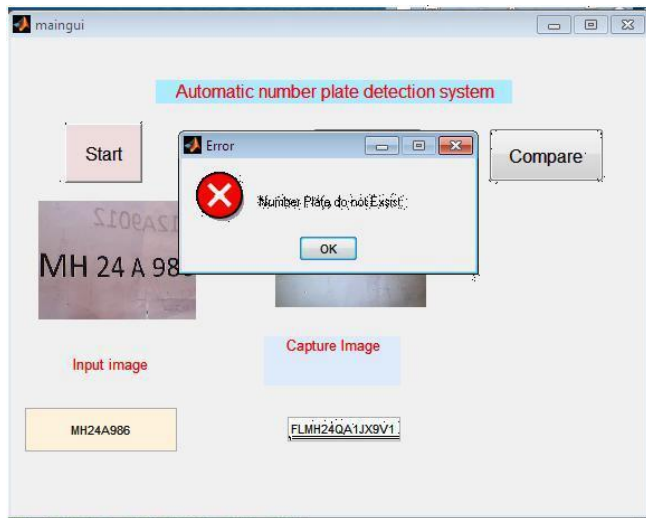


**Figure 4:** Raw Image



**Figure 5:** Number plate exit

**Figure 6:** Number plate not exit

Image with details like date, amount. In some cases characters are not properly recognized due to some problems like improper size of segmented character and templates.

## 7. Conclusion

The proposed system of the recognition and detection system for theft vehicle by number plate can be implemented using above discussed method which involves fundamental Image processing steps using MATLAB. We can detect and recognize license number of captured front view image of any vehicle by camera. It contains main three processes: plate extraction, character detection and character recognition. Further, we can detect stolen vehicle by comparing it with database of stolen vehicle provide by police station. Afterword, it rings an alarm and sends a SMS to police station. It is increases for the security of vehicles. It can be used in many security purposes like speed detection, detection of traffic violation, toll collection, parking system. It can also beneficial to secure areas like the gate of residential area, factory gates, parking space, toll plazas, university entrance or other high-secured building such as defense institutes and nuclear factories.

## References

[1] Christos Nikolaos E. Vassili Loumos ,Anagnostopoulos, Ioannis E. Anagnostopoulos, ,and Eleftherios Kayafas- A License Plate Recognition. Algorithm for Intelligent Transportation System Applications IEEE transaction on Intelligent Transportation System, Vol. 8, No. 3, Sept 2006.

[2] Choudhury A. Rahman, Wael Badawy,Ahmad Radmanesh A Real Time Vehicle.s License Plate Recognition System Proceedings of the IEEE Conference on Advanced Video and Signal Based Surveillance,0-7695-1971.June 2010.

[3] Banshidhar MajhiHeuristics for license plate localization and hardware implementation of Automatic License Plate Recognition (ALPR) systemDepartment of Computer Science and Engg, National Institute of Technology Rourkela, 2012.

[4] C. Zhang, D. Zeng, J. Li, F.-Y. Wang, and W. Zuo, Sentiment Analysis of Chinese Documents: From Sentence to Document Level, J. Am. Soc. Information Science and Technology, vol. 60, no. 12, pp. 2474-2487, Dec. 2009.

[5] G. Qiu, C. Wang, J. Bu, K. Liu, and C. Chen, Incorporate the Syntactic Knowledge in Opinion Mining in User-Generated Content, Proc. WWW 2008 Workshop NLP Challenges in the Information Explosion Era, 2008.

[6] Q. Su, X. Xu, H. Guo, Z. Guo, X. Wu, X. Zhang, B. Swen, and Z. Su, Hidden Sentiment Association in Chinese Web Opinion Mining, Proc. 17th Intl Conf. World Wide Web, pp. 959-968, 2008.

[7] R. Mcdonald, K. Hannan, T. Neylon, M. Wells, and J. Reynar, Structured Models for Fine-to-Coarse Sentiment Analysis, Proc. 45th Ann. Meeting of the Assoc. of Computational Linguistics, pp. 432- 439, 2007.

[8] B. Pang and L. Lee, A Sentimental Education: Sentiment Analysis Using Subjectivity Summarization Based on Minimum Cuts, Proc. 42nd Ann. Meeting on Assoc. for Computational Linguistics, 2004.

[9] E. Cambria, D. Olsher, and K. Kwok, Sentic Activation: A Two- Level Affective Common Sense Reasoning Framework, Proc. 26th AAAI Conf. Artificial Intelligence, pp. 186-192, 2002.