Features Enhancement and Efficiency Optimization of HSNP by HSVP System of Vehicle Number Plates

S. P. Singh, Vikash Sharma

Abstract – High security number plate (HSNP) deals with metal plate mounted on the motor vehicles having a unique number allotted to that vehicle. The plate is the only identification of the vehicle in the first sight. This plate helps in the searching and tracking of the vehicle whenever required. These important features of plate make it an important part of the vehicle and increase the chances of its misuse, like its tempering, its replacement with wrong plate etc.

The paper proposes a system HSVP (High Security Vehicle Plate), which makes the vehicle secure and restrict the cases of vehicle stolen completely or in parts. The system enhances the features of the existing HSNP system and improving the efficiency of the vehicle tracking system by providing an effective automated system. HSVP may also be utilized to optimize the functioning of the traffic police.

Keyword: HSNP, HSRP, HSVP, SVM, SIM, UID, RTO.

I. INTRODUCTION

As the ordinary number plates can be easily tempere there by making car theft a left hand jobs for thieves. Th High security number plates are more reliable and can b used only once.

Implementation of High Security Number Plates is bein in the consideration of Government since 1989, but the process gets delayed and delay and now this time the process gets into working mode only after the Supreme Court of India had ordered all the states to get the High Security Number Plates installed on all vehicles by 2014.The major reason as to why this process needs immediate attention is the increasing number of vehicle thefts [1].

The HSNP system restricts the tempering of number plates by making it once usable hence the cases of vehicle theft reduced. But even after installation of HSNP, one can easily exchange or sell the engine of a theft car to another one. The proposed system HSVP trying to put a benchmark on these type of cases by adding more details to a chip mounted on the number plate subsequently by having a reader device to read the information of the chip and match the details, it enhances the capabilities of the traffic police.

II. EXISTING SYSTEM

They are New Age Number Plates which are non breakable and built on 1mm thick aluminum sheet having 7 digit laser imposed unique code with a Chakra image having 'IND' - depicting India on left side along with non removable snap lock. The deadline for High Security Number Plates is 2 year and is mandatory for both New Cars and Old Cars in all Metros, Semi Metro and Other Cities of India.

As the name says, A High Security Number Plate is a highly secured plate that is used for Displaying Registration Marks in a uniform pattern. Here are some of main points about the composition of these plates.

- Metal: These plates are made of Aluminum that contains some unique details along with the Registration number.
- Uniqueness: These plates have a 7 digit unique laser code, a Chromium based Chakra Hologram, Vehicle Chassis number and a self destructive sticker. All these Symbols and number made the number plate unique and cannot be used on any other vehicle. The plate also has IND written in blue on the plate.
- Snap Lock: These plates are also equipped with a non-removable and non- reusable snap lock to prevent counterfeiting. A snap lock is basically a lock that is designed in a way to get the plate fixed at its position. If there is any attempt to break the lock, i will make it impossible to get it installed on other vehicle.[1]

With the number of vehicle thefts increasing day by day, one feels vulnerable for the safety of his/her car. These thefts are easily carried out by using very simple everyday objects like hangers to break into car doors with many high end systems installed in cars failing to prevent it from being stolen and none of the stolen vehicles ever found. Therefore, it has become necessary to a sound security system and the directive of the Supreme Court has made High Security Number Plates mandatory for all the vehicles, new as well as old, to have these plates installed by the year 2014. This is a positive step to curb such thefts incidents in the major cities like Delhi, Chandigarh, and Bangalore etc. [1]

Fig 2.1: High Security Number Plate Description [2].

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- High Security Number Plates as the name suggests aim at providing security to one's vehicles and its thefts. It is made of 1 mm aluminum, and a registration mark is displayed on the front, rear and the windshield of the cars. These plates have a 7 digit unique laser code and a self destructive wind shield sticker. Chromium based Chakra Hologram with "IND" is in scripted on these plates as well, while an important feature of these High Security Number Plates is a non- removable snap lock that keeps the plate in its place and any attempt to break it or reuse it is not possible, thus preventing any counterfeiting. How to get High Security Number Plates installed on your vehicles- To get High Security Number Plates installed on your vehicles as soon as possible follow these steps given below.

In order to install High Security Number Plates on a new vehicle, the first and the foremost step is to visit the Local Regional Transport Office (RTO) and contact the Motor Licensing officer. The officer will hand over the approval slip to the owner after checking the documents of the car.

- The next step is to visit the High Security Registration Plates centre to pay the registration plate charges.
- After paying the charges, a date is fixed by transport department for fixing the High security Number Plate and the owner has to turn up on that date at the HSRP centre, where it is a 5 minutes job to install the High Security Number Plates of your vehicle.
- You can also check the status of your number plate, whether it is prepared or not, by visiting the website of your state transport department.

Fig 2.2: Displaying Manufacturing of HSNP [3].

These High Security Number Plates provide safety to the cars and prevent vehicle theft that is so easy to accomplish in cars with ordinary number plates. So to exercise safety for your car, go ahead and install High Security Number Plate in your vehicles, as soon as possible.

III. OTHER RELETED WORK

A. Ranchi anti-theft number plate project

The system of installing tamper-proof high security registration plates (HSRP) on newly registered vehicles was started in the city on directives from the Supreme Court in June 2012 as these number plates would have helped nab vehicle thieves and identify traffic rule violators.

The project, however, did not last long and had to be shut down due to several reasons. Transport commissioner K K Khandelwal said: "HSRPs have aluminum coating and a chromium hologram that cannot be faked. An embedded microchip contains all the information encoded in the registration cards. The registration number is laser imprinted and bears alphanumeric identification marks of the manufacturer. The number plate is attached to the car with a non-reusable snap lock and if somebody tries to remove it, it gets permanently damaged. This prevents theft and duplication."

The department had signed a deal with the Delhi-based Agro Impex (I) Pvt Ltd for installation of HSRPs on vehicles of Ranchi. Khandelwal said: "The work was going well in the beginning, but then we realized that the company was violating several rules so we had to stop the work."

The major reason for the cancellation of contract was that the company was unable to meet the deadline of installing number plates. "When the company was functioning here, as many as 31,000 vehicles were registered but only 3,000 HSRPs were installed. We had no other option but to terminate the contract," said Khandelwal [4].

Khandelwal said that the installation of HSRPs will restart soon. "We released a tender and received nine applications. We have already selected a company and sent the details to the transport department for approval. Once that is done, the work of installing HSRPs will resume," he said [4].

B. OCR Project

One of the things necessary for designing a completely automatic system for opening a gate (for the faculty parking lot, in our case) without installing a signal transmitter in each car, is a system which can read the license plate of an approaching vehicle, and see whether or not it is permitted to enter [8].

In this project, first we separated each digit from the license plate using image processing tools. Then we built an SVM classifier, using a training set based on digits extracted from approximately 430 license plates. Finally, we built a Graphical User Interface for selecting a picture of a license plate, to identify the number on it [8].

License plates come in different sizes and in different Width-Height ratios, the fonts used for digits on license plates are not the same for all license plates. These problems, and the changing weather conditions, are what make the field of License Plate Recognition a good candidate for testing Pattern Recognition techniques, such as SVM. The system is built to be able to construct a new training set at the moment, for later use, however we would recommend designing a tool that will enlarge an existing set.

The method we used for deciphering the numbers from the images was first to separate the figures of the digits from the total image of the license plate. This is done by first transforming the grayscale picture of the license plate to a black-white image. The threshold for this transformation was first determined by using the 'graytresh' Matlab function, and if the result was insufficient, various thresholds were tried, until the most successful of those is found.

The separation of the digits is done by first filtering all objects which are not likely to be digits, because of their dimensions, their location or their orientation.The method used for identifying the digits is SVM (Support Vector Machine).

This method receives a training set of labeled feature vectors, and uses it to separate a Hilbert Space into decision areas. If a linear separation is applied the separating spaces will be in the form of $W^T X + b = 0$. Otherwise, they will be in the form of $W^T f(X) + b = 0$

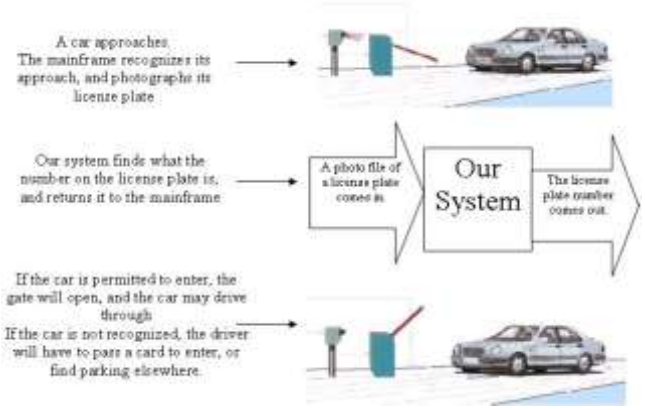

Fig 3.1: OCR System

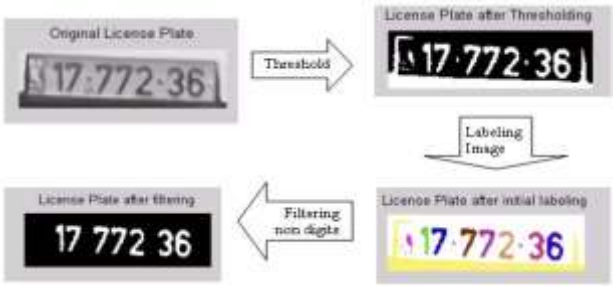

Fig 3.2: Filtering Process of unwanted LP noises.

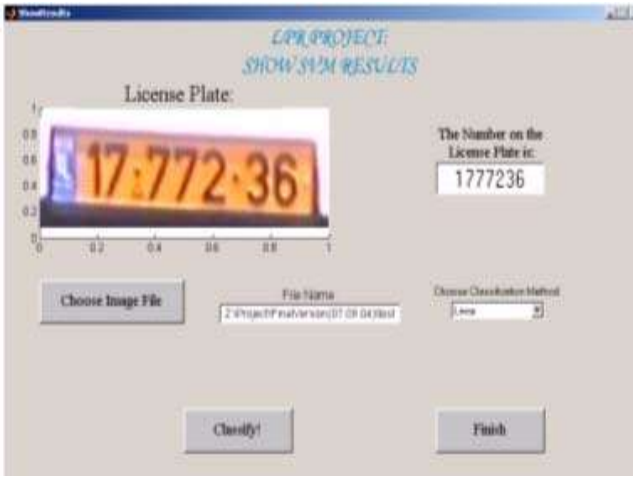

Fig 3.3: GUI for identifying number on a license plate using SVM classifier.

IV. PROPOSED SYSTEM

UID for vehicles is a unique project was the main theme of the project is to prevent the theft of the vehicles. A SIM card will be designed such that it contains certain information .a detector will be designed such that it gathers and displays all the information contained the SIM card. This project consists of different parts or modules. The modules are listed below:

- SIM card designing
- Detector designing

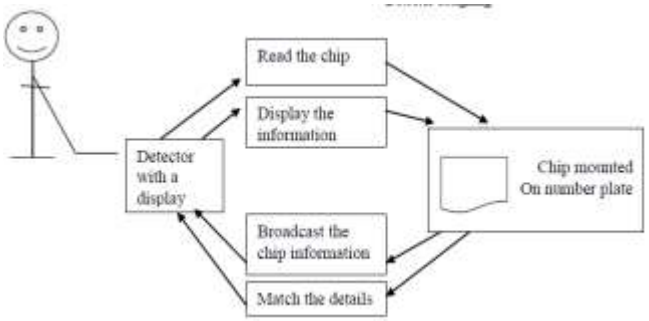

Fig 4.1: Working of HSVP.

The program consists of different parts where each part will do a specific job. The main modules of the program are listed below:

- Vehicles information
- Owners information

The attributes of the above listed parts are:

Vehicle attribute	Owner's attribute
Vehicle number	Owner name
Model number	Owner DL number
Chassis number	Owner id card(voter card, pan card)
Engine number	Owner id card number

The departments which are involved in the total working of the project are:

- Traffic police department
- RTO office

The power which will be given to a department are restricted and listed below:

- Traffic Police department: this department will only check each vehicle with the help of the detector and can fine in case of the expiry of date of pollution or insurance. The police are also given a extra power to seize the vehicle if any information displayed on the detector contradicts with the real information.

RTO office: this department will have the maximum authority, it will give away the SIM card as well as it will update the information which is received by it form the pollution department, & insurance companies.

V. ADVANTAGES OF PROPOSED SYSTEM OVER EXISTING SYSTEM

Feature	Existing System	Proposed System
Vehicle details	Registration number, A unique number for registration plate	Registration number, chassis number, engine number, model number, make detail, registration validity, etc
Owner details	Not Available	Name, Address
Vehicle tracing	Manual	Automated with the help of detector
Sale of stolen vehicle	Possible not as a whole but in parts	Neither as a whole nor in parts as detector will automatically trace such vehicle
Crime Benchmark	Less effective as the stolen vehicle can be sold in parts	Highly effective as the thief will not get the appropriate value
Sale/Purchase	Becomes less risky but the possibility of parts exchange exist	Becomes highly secure by removing the chances of parts exchange

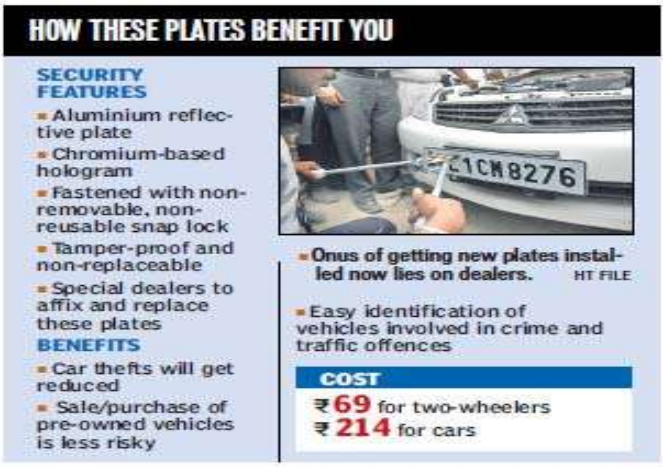

Fig 5.1: Benefits of HSNP [1].

VI. FUTURE PERSPECTIVE OF PROPOSED SYSTEM

The proposed system can be enhanced to the fully automated system by replacing the detector device by a chip mounted on all red lights, toll barriers and check barriers. In that case, as any vehicle get enter into the signal range of the chip mounted on signals, the vehicle will automatically get checked for its authentication. If the details broadcasted from the vehicle will not match with the details available in the database of chip mounted on the signals then the number of that vehicle will automatically get displayed on a screen and also get send to the nearest check point. In this way the tracking system will become very efficient.

VII. CONCLUSION

Before the existence of the HSNP system there was no way to check the authenticity of the number plate and also there is no way to stop vehicle stolen. But as HSNP comes in to picture the authenticity of number plate is highly effective as snap lock works with aluminum plate by making it non replaceable. HSNP is a highly effective System with some key features like snap lock, aluminum plate, laser code, etc.

The system described in paper, HSVP (high security vehicle plate) improve the efficiency of existing system HSNP by providing additional features to it. The system provides a detector for automatically detection of the fake vehicle that cannot be possible in HSNP. HSVP contain all information about the registration number, vehicle itself as well as the owner's details.

HSVP system helps to track the stolen vehicles, hence helps in reducing crime and to avoid terror for misuse of vehicles. System optimizes the working of vehicle tracking bodies by providing them an automated system.

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REFERENCES

1. http://www.highsecurityplates.com/2012/04/high-security-number-plates-is-starting.html
2. http://www.jagran.com/delhi/new-delhi-city-9704256.html
3. http://noida.newzstreet.com/news.php?slug=no-easy-way-for-noidaites-to-install-high-security-number-plates-in vehicles&news_id=10359
4. http://www.jharkhand.gov.in
5. Coifman, B., "Vehicle Reidentification and Travel Time Measurement in Real-time on Freeways Using the Existing Loop Detector Infrastructure," Transp. Res. Rec. 1643, pp. 181-191.
6. Kim, S.W., Y. Eun, H. Kim, J.I. Ko, W.J. Jung, Y.G.. Choi, Y.G.. Cho and D. Cho, Performance Comparison of Loop/Piezo and Ultrasonic Sensor-based Detection Systems for Collecting Individual Vehicle Information," Proc. 5th World Congr. Intell.Transp. Syst.,Seoul, Korea.
7. License Plate Recognition Using Image Processing Techniques & SVM Classifier by Shemesh and David Arieh Fellman
8. Yung, N.H.C., K.C. Chan and A.H.S. Lai, "Vehicletype Identification through Automated Virtual Loop Assignment and Block-based Direction Biased Motion Estimation," Proc. IEEE/IEEJ/JSAI Int. Conf. Intell. Transp. Syst., Tokyo, Japan.
9. Kim, S.W., J.I. Ko, H. Kim, I. Cho and D. Cho, "A New Loop-detector Circuit for Improving lowspeed Performance," Proc. 6th World Congr. Intell. Transp. Syst., Toronto, Canada.
10. Passino, K.M. and S. Yurkovich, Fuzzy Control, Addison-Wesley, Reading, MA.
11. Lai, M., M. Nakano and G. Hsieh, "Application of Fuzzy Logic in the Phase-Locked Loop Speed Control of Induction Motor Drive," IEEE Trans. Ind. Electron., Vol. 43, No. 6, pp. 630-639.

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