Survey on Smart Tollbooth and Theft Vehicle Detection Using HC2D Barcode

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ABSTRACT: In this system we studied how to make effective and faster toll collection system which is based on HC2D barcode. To reduce the traffic over the toll plaza we developing the tollbooth system in which toll payment will be deduct from account automatically no one need to make queue on tollbooth for payment of toll plaza. In this system we use Smartphone camera for capturing the image of HC2D barcode which can be placed over each and every vehicle. The captured image would be send to barcode decoding process and after that the toll would be deduct from the customer's
Bank account and then open the tollgate. In our system if vehicle stolen then entry has been made in centralized database by RTO and if this vehicle entered in specific tollbooth silent alarm would buzz which would indicate the operator at the toll booth that the vehicle is a stolen vehicle and after that police authorities help them for catching thief. At the same time the mail would get send to owner of vehicle and police man nearer to the tollbooth for the identification of the vehicles, the information of the vehicles is already stored on the central database. So captured number will be sent to the server received at the toll.

KEYWORDS:HC2D,ETC, OTP, Smartphone, Camera as scanner.

I. INTRODUCTION

Now days Electronic Toll Collection(ETC) is increasing rapidly all over world for its well know advantages. In ETC systems various electronic equipments are use i.e. RFID, Laser technology and (HC2D) barcode etc. In all of those RFID and laser technology are most expensive but barcode technique is more effective and affordable than that both. So in this paper we will discuss in detail about barcode (HC2D). HC2D barcode is belonging to matrix barcode family. HC2D has series of parallel lines and many white spaces. Different combination of spaces and bars make various types of characters, numbers and letters. HC2D barcode have capability to store large amount of data in small space. In these studies we focus on collecting toll according to vehicle and generate real time application which is use for toll payment and scan the HC2D barcode that were placed over vehicle for its legal verification, automatic toll collection system is one of the more effective and efficient system in the world of many traveler or transport business / system. In this system we more likely focus on provide safe, secure, effective, reliable toll collection system. Before ETC system vehicles need to wait on tollbooth for toll payment, long time wait for toll payment created many problems like traffic congestion, Pollution, people's frustration, fuel wastage. Our proposed system help for the reduce traffic jams, avoid unnecessary delay while collecting toll tax also staying eye on unregistered and stolen vehicles for security reasons.
 To effective and fast collection of toll on toll plaza we developed IPTB System. When vehicle passing from the tollbooth there is no need to stop in queue and collect the toll instead of that the amount of toll will be automatically reduces from the vehicles owners account. ANPR technology has been used in this automatic system.
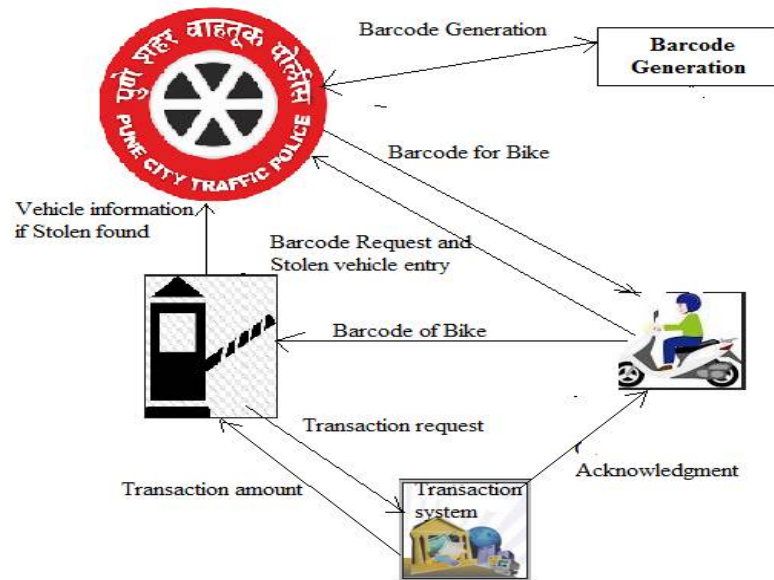
Fig.1 Architecture Diagram

Above system architecture works effectively and accurately with best results after the following of their different type of system modules and that modules are given below within their short detail.

- AVC (Automatic Vehicle Classification): AVC automatically verifies the classifications of different types of vehicles like four wheeler or any other heavy vehicles using image processing system. Each and every vehicle has been classified during registration of their vehicle in RTO office.
- AVI (automatic vehicle identification): For getting the effective access control over vehicle AVI (Automatic Vehicle Identification) system has been developed. With the help license plate recognition (LPR) automatically vehicle has been identify accurately. LPR plays an important role in automatic tollbooth system of identifies and verifies the vehicles and monitoring over the entire vehicle for the reasoning of traffic management. Each and every vehicle having unique license plate for their authorized identification of vehicle but in future barcode is also compulsory similarly as compared to number plate because any one can change the number plate and hide identity of registered vehicle owner.
- Traffic Controller System: In this system using embedded camera for managing traffic related problems and mainly focus on to avoid traffic and make faster and efficient toll payment without any interruption. Hence they able to manage traffic congestion.
- Centralized Server: Centralized database system used for stored each and every information related tollbooth and this information is related with respect to tollbooth's location etc. and also stores information of all registered vehicle regarding owner detail, bank detail, chassis number etc. This required information is getting from police authorities and send it toward RTO office for making entry of stolen vehicle in centralized database all of this process is happen after owner's vehicle stolen by thief and make FIR for that complaint. Every tollbooth is fulfilled with computerized system with high functioning of security purpose. Computer of every toll plaza is connected to a centralized server through Internet. Each vehicle owner has to be registered in central server and deposit money on account. AVI and AVC totally depend on the vehicle license number plate.

The benefits for the motorists include:
- ➢ Less or shorter queues at toll plazas by increasing toll booth service turn around rates.
- ➢ Faster and more efficient service for making toll tax payment (no exchanging toll fees by hand);

➢ The ability to make successful payment by keeping a balance on the register account.
➢ The use of prepaid toll statements (no need to request for receipts)therefore help to reduce wastage of paper .

Other general advantages for the motorists include fuel savings and reduced mobile emissions by reducing or eliminating deceleration, waiting time, and acceleration. Meanwhile, for the toll operators, the benefits include:
➢ Lowered toll collection costs.
➢ Better audit control by centralizing user accounts.
➢ Expand capacity without building more infrastructures.

II. LITERATURESURVEY

"An Implementation of a High Capacity 2D Barcode"

A high capacity two-dimensional barcode and its design and the implementation is presents in this paper which shape and size are suitable for attaching to the document in the form of paper or print media. In proposed system implementation of Barcodes is reduced usage space as compared to other application. Barcode may contain text and binary code. In our system we used high capacity 2D barcode. The proposed system implements 2D barcode for data compression and increased space efficiency. Hence large amount data and content of data will be stored. After compression, the maximum data size is 24,400 bits.

"Understanding 2D-BarCode Technology and Applications in M-Commerce – Design and Implementation of A 2D Barcode Processing Solution"

There are required more wireless information services and mobile commerce applications as the swift increase of the number of mobile device users. Today people are looking for innovative solutions to use barcodes in the wireless world since various barcodes have been used for decades as a very effective means in many traditional commerce systems. Recently, because 2D-barcodes not only provide a simple and inexpensive method to present diverse commerce data, but also improve mobile user experience by reducing input factors. In our studied examine 2D barcode system concept, types. Most of the mobile applications can support 2D barcode processing system. Moreover, the application examples, and case study using the solution are presents in this system.

"A Data Matrix-based mutant code design and recognition method research",

A Data Matrix based mutant code design developed by 2D matrix barcode. By simulating actual environment a distorted image of a mutant barcode was obtained. By barcode localizing the barcode area in the image was acquired. These barcode characteristic parameters were abstracted after the barcode area being analyzed and with the studies image distorted fitting formula was increased. By this way, the barcode recognizing speed is faster than others, and this method was robust, is shown from the actual testing result,.

"AUTOMATED TOLL BOOTH AND TRACKING SYSTEM FOR THEFT VEHICLE".

In this system tollbooth is automatically reduced by using number plates of bike. Stolen vehicle is also detected by using same number plates. The camera device is used to detect the stolen vehicle or for the tollbooth reduction. The main drawback of this system is that the number plate of bike is visible to ordinary people and he can easily change the number plate. And also one more drawback is there are fixed camera devices are there but angel of that device is fixed so it's very difficult to capture the number plate image if it get hidden of somewhere bend. Also it's too difficult to detect the number for fancy number plates for example number 4141 can be written as MAMA in Marathi.

"Automated Toll Booth System:"

The main purpose of this project is to collect the correct toll value, according to vehicle's class, automatically on arrival of the vehicle at toll booth. It is needed to build a real time application, which recognizes reliable, safe and environment friendly. At present, customers have to wait at the toll booth, for long time, to pay the collector. Automated toll system would successfully remove unnecessary traffic delays; keep an eye on any car that might not be correctly registered or number plates exchanged for theft purpose. Automated toll collection is fast becoming a globally accepted for toll collection. This system was developed only for tollbooth amount reduction for vehicle. Image processing technique is used to guess the bike number. The bike number is recognized as unique number in this system.

III. PROPOSEDSYSTEM

Now day's complaints stolen vehicle is increasing in large amount. So there is strictly need to develop that kind of system which is helpful for reducing this type of various stolen cases in some amount. Also to pay the road toll we need to face the time required due to traffic. The main objective of this proposed system is to develop a handy barcode which can be created by barcode generation system work under RTO to detect the stolen vehicle and reduce the time required for making payment of tollbooth tax. Design the system which will automatically deduct certain amount of toll tax from the user's registered bank account.

- Using this system, we can detect the stolen vehicles easily.

- System will help to reduce the time required at tollbooth.

Methodologies of Problem solving and efficiency issues:

Barcode Generation:

- Divide the 63*448 matrix into 32 smaller matrices so as to encode the 32 byte hash value on the barcode.

- So 63*448 is to be horizontally divided into 32 windows, of which 4 on left line and 4 on right line are to be utilized.

- So 440/32 = 13.75 which is not an Integer, so we consider only 416 horizontal pixels of the barcode which gives 416/32=13.

- Hence we can divide the 63*416 matrix in to 32 smaller matrices of 63*13 size each.

- Once the pixel division is done, we first need to perform the structure of the HC2D barcode as in the existing system.

- So we first complete the left line, right line, bottom line and the dashed line is drawn which help in data detection points of the barcode.

- Once the framework is designed , create the hash value of the data to be encoded and write each hash code in the form of integer value by converting 32 byte hash values to corresponding integer equivalent.
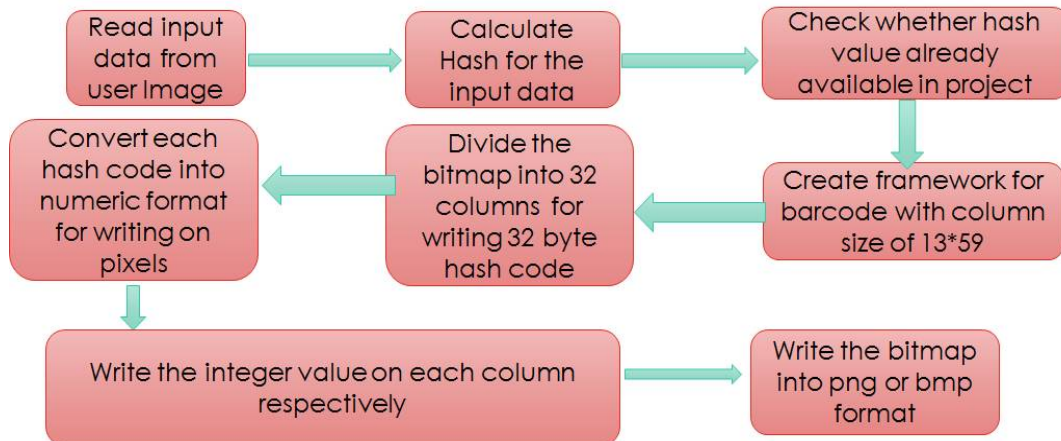
Fig.2: Barcode Generation

Barcode Detection:

- The Divided 63*448 matrix into 32 smaller matrices is considered as a single hash code.
- So 63*448 is to be horizontally scanned to and the corners of the barcode so as to detect the reading point of the encoded data.
- Once the left corner and right corner is found, the data between these two corners is read column by column with the width of 13 and height of 59 till bottom corner is detected.
- Here, when user reads the data from encoded columns, reader checks whether read data id !=0, i.e. whether current pixel being read is not the background pixel, if not, that value is preserved and next column is traversed and so on.
- After decoding the hash code, this value is passed to the server to retrieve the corresponding data value encoded with respect to the hash.
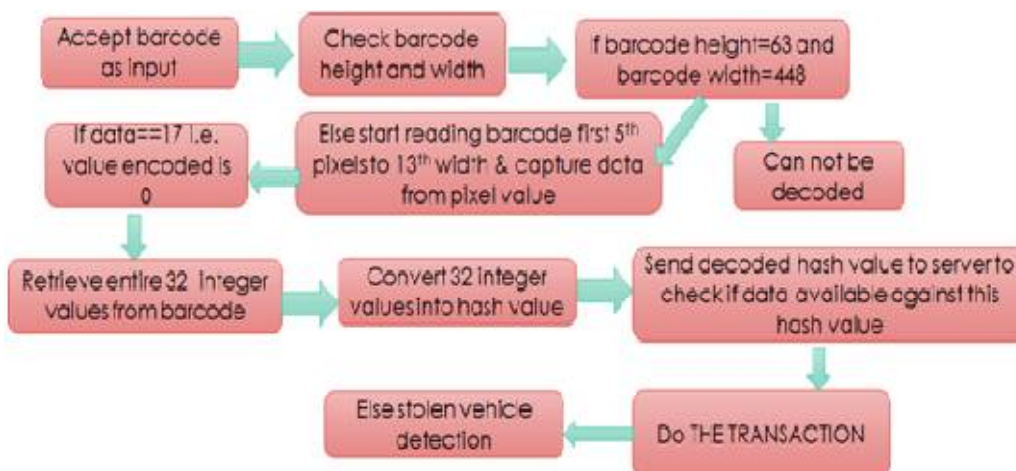

Fig 3: Barcode Detection

For developing this system we will required and eclipse id and implementation language will be Java. For backend we are going to use myself. Above mention software are easily available on internet. So that we can get them easily. User needs to provide exact vehicle details to generate the barcode for vehicle registration. The development of the system will be constrained by the availability of required software such as web servers, database and development tools. The availability of these tools will be governed by developer of the software. Most recent versions of software development tools may not be installed at the client side.

Barcode Generator:

- In this module, when user buys a vehicle, then he gets a barcode including all of its information related to vehicle i.e. owner name, vehicle number, chassis number, Bank details and all of these data put it into barcode using encoding technique by barcode generation authority.
- Barcode generation authorities work under RTO. All information of owner is provide from RTO to barcode generation authority.
- In this barcode a unique id is present which is very important to detect stolen vehicle.

RTO Office:

- RTO is initial state before starting of barcode generation process for vehicle. After getting all legal information from owner about vehicle RTO officer send it to barcode generation system.
- RTO makes entry for stolen vehicle in centralized database after receiving FIR complaint from police.
- When stolen vehicle is detected by stolen vehicle detection system, then owner of vehicle will get text message or mail from tollbooth operator.

Vehicle User:

Vehicle user will get the barcode for their own vehicle protection or security because any one can change the number plate of vehicle and stole vehicle easily.

- If user's vehicle will stole, then he will make an entry to the RTO's centralized database through police.

Tollbooth Operator:

- Toll operator deducts the particular amount road tax already that toll had from user bank account.
- After successful transaction from user bank account automatically send text message or   mail to them

The purpose of this document is to define the requirements of taxi business system for Mobile Users. In detail, this document will provide a general description of our project, including user requirements, product perspective, and overview of requirements, general constraints. In addition, it will also provide the specific requirements and functionality needed for this project - such as interface, functional requirements and performance requirements.

IV. CONCLUSION

Thus a system for Image Processing Based automatic Toll Booth in Indian Condition which is secure and highly reliable can be obtained. It can be used to remove all drawbacks with the current system such as time and human effort and it also doesn't require any tag only required best quality camera and barcode at the front end of vehicle. This system also helps to detect the stolen vehicle.

REFERENCES

[1]   Vehicle_Registration_Plates_of_India.Available: http://en.wikipedia.org/wiki/Vehicle_registration_plates_of_India.

[2]   Ward Nicholson, "License Plate Fonts of the Western World", Available at http:// www.leewardpro.com/articles/licplatefonts/licplate-fonts-intro.html

[3]   Shan Du, Member, IEEE, Mahmoud Ibrahim, Mohamed Shehata,Senior Member, IEEE and Weal Bradawl, Senior Member,IEEE,"Automatic License Plate Recognition (ALPR):State of the Art Review", Available at "ieeexplore.ieee.org" Vole 23, 07 June 2012.

[4]   M. M. Shadier, S. P. Marot, "Number Plate Recognition for Indian Vehicles", in IJCSNS, Vole 11 No.2, Feb. 2011

[5]   S Shams Base, M Manipuri, D K Basu, "License Plate Localization from Vehicle Images: An Edge Based Multi-stage Approach", in International Journal of Recent Trends in Engineering (Computer Science), Vole 1, No. 1, pp. 284-288, May2009.

[6]   Ancash Roy Debars, Patanjali Goshen, "Number Plate Recognition for Use in Different Countries Using an Improved Segmentation", Available at http://ieeexplore.ieee.org, Vol2, June 2012

[7]   S.Kranthi, K.Pranathi, A.Srisaila," Automatic Number Plate Recognition", available at http://ijict.org/, Vol 2, No 3 (July 2011).

[8]   SubhashTatale,AkhilKhare,"Real time ANPR for vehicle identification using neural network", ijaet, Vol. 1, Issue 4, pp. 262- 268, Sept 2011

[9]   "ANPR Manual - Tech liberty NZ", Available: http://techliberty.org.nz/wp-content/uploads/ANP