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Implementation of Advanced Security System using QR Code for Catching Stolen Vehicle

Pragati[1], Sanika[2], Sonali[3], Priti[4].
[1, 2, 3, 4]*Department of Computer Science, Aissms coe, Pune, Maharashtra, India*

Abstract: ***In India, which is a developing country ,it always needs a significant improvement in infrastructure such as Roads or Highways. These constructions' of highways is costly, which can't be done by the government alone. Normally Public personal partnerships square measure made to construct such an enormous projects. The money spent on these projects can be regained by collecting toll from the passengers who uses the roads. The toll collection system, particularly in developing country like India faces some issues such as long queue lines, escaping from toll plazas etc. These systems can service only 300 vehicles per hour, and if more than that number of vehicles arrive at that plaza, server traffic jams may occur.***
Number of crimes involving vehicle stealing has increased with the increase in number of vehicles. Although there are many strict laws being in place, thieves can still get a way to stay one step ahead and vehicle theft is still among one of the most reportable crimes worldwide.
To solve these problems, we propose QRCode based toll collection system. In our proposed system at the time of vehicle registration, QRcode is generated. We collect toll and identify vehicle is stolen or not at the toll collection booth.
Keywords: QR-Code, Electronic toll collection, Toll Authorities.

I. INTRODUCTION

If you are driving a long distance and are trying to get there as quickly as possible, you will probably travel along highways and interstates that allow you to travel faster and have fewer stops. These kind of roads have occasional stops where you have to pay money to travel on the road. These types of roads are called toll roads. The other name for toll roads is toll-way. You have to pay a fee called toll when using the toll road. Most roads are built with local, state or national government money raised from taxes. Toll roads allow new roads to be engineered and maintained without raising taxes on the general public. A highway doesn't always stay a motorway forever, though. Once the price of construction has been recovered from the tolls collected. You'll know you're on a highway once you encounter a piece of land. A gated space wherever you've got to cut down or stop to pay a toll to continue traveling on the road is called a toll plaza. There are many lanes with tollbooth available to reduce traffic as much as possible. Some lanes could have people operating the toll booths, so you will be able to pay the toll to respective collectors. Because number of vehicle are increasing rapidly, these lanes are getting slower and slower day by day. To solve this drawback we are aiming to use QRcode which will help in reducing the effective time taken at toll booths.
QR is short for Quick Response Codes. They are accustomed take a bit of data from a transient media and place it in to your mobile phone. You may shortly see QR Codes during a magazine advert, on an advertisement, an online page or maybe on someone's T-shirt. Once it's in your mobile phone, it's going to offer you details that business (allowing users to look for near locations), or details about the person wearing the t-shirt, show you a computer address that you'll be able to click to visualize a trailer for a show, or it's going to offer you a coupon that you'll be able to use during a native outlet. The reason why they're additional helpful than a regular barcode is that they will store far more knowledge then the traditional barcode.
In our project we have a tendency to use QR Code to store all info of car similarly as vehicle owner. QR Code can contain vehicle owner name, address, mobile number, email id, owner driving licenses number, vehicle number, vehicle sort, user sort like pass holder/ non pass holder, etc. Toll collector will scan the QR Code to vehicle authentication and toll collection.

II. LITERATURE REVIEW

A. Automated Toll Collection System Using Gps And Gprs

1) Author: Sudheer Kumar Nagothu

2) Abstract: Developing countries like India needs a significant improvement in infrastructure such as Roads or Highways. Construction of these highways is a costly affair, which can't be invested by the government alone. Normally Public private partnerships are made to construct such a huge projects. The money spent on these projects can be regained by collecting toll from the passengers who use the roads. The toll collection system, especially in India faces some problems such as long queue

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lines, escaping from toll plazas etc. These systems can service only 300 vehicles per hour, and if more than that number of vehicles arrive at that plaza, server traffic jams may occur. To solve this we are proposing to create geo-fences using GPS by giving latitude and longitude of the corner of the toll plaza. By comparing the position of the vehicle and toll plaza, the owner of the vehicle can be charged from the account.

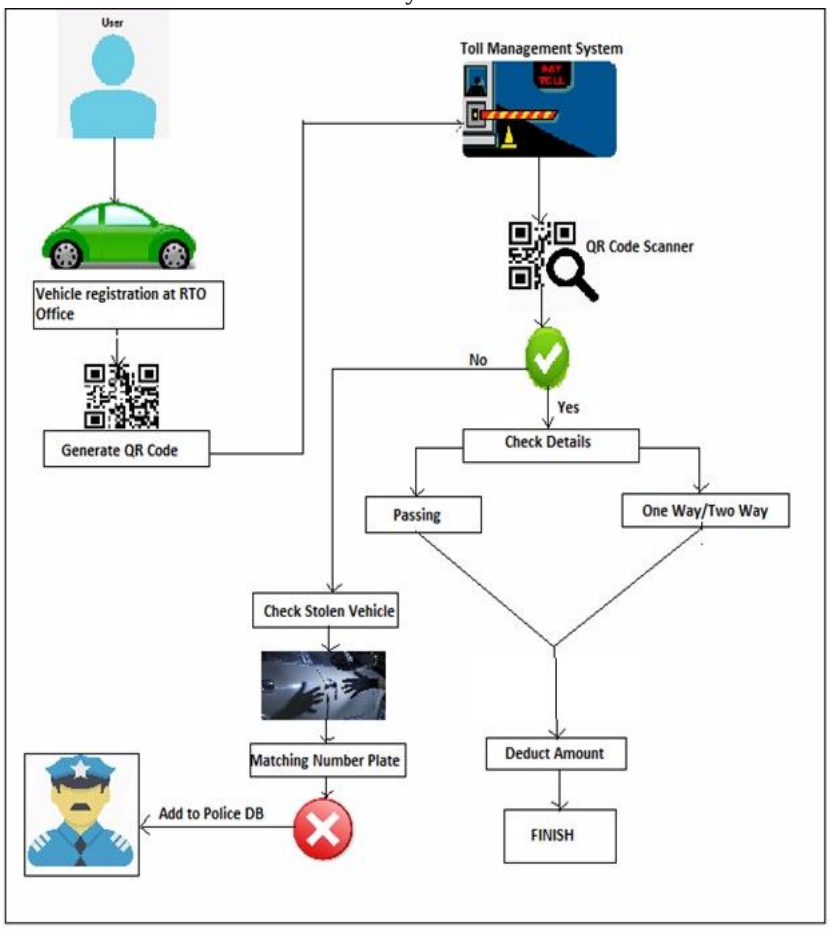
B. Automated Toll Collection With Complex Security System

1) Author: P. Kamalakannan; M. Balaji; A. Avinash; S. Keerthana; R. Mangayarkarasi

2) Abstract: The paper is concerned with automated toll collection system using the active RFID tags; vehicles are made to pass through a sensor system that is embedded on the highway just before the tollgate. The system will electronically classify the vehicle and calculate the exact amount to be paid by the vehicle owner, ensuring no pilferage of the toll amount. Vehicle owners, who frequently pass through tollgates, are required to have a prepaid smartcard, which will deduce the appropriate amount, by using an automated smart card reader [1]. A Micro controller consists of a powerful CPU tightly coupled with memory RAM, ROM or EPROM), various I / O features such as Serial ports, Parallel Ports, Timer/Counters, Interrupt Controller, Data Acquisition interfaces-Analog to Digital Converter (ADC), Digital to Analog Converter (DAC), everything integrated onto a single Silicon Chip. The Microcontroller is connected with personal computer through RS232 data adapter

III. PROPOSE SYSTEM

Combination of toll collection and vehicle identification system is included in proposed sytem. User registers on system, after registration QRcode get generated. QRcode contain all the information about vehicle and vehicle's owner. At tollbooth, toll collector will scan QRcode and identify user and vehicle. Also he checks user is prepaid user (pass holder) or regular user. If user is regular user then deduct amount according to method,or two way traveling toll charges. Every time after renewing of pass; generate new QRcode. If user is Pass holder he will be allowed to proceed and if user is regular user the respective charges will deduct after scanning of qrcode. At the same time we have a feature to identify vehicle is stolen vehicle or not.



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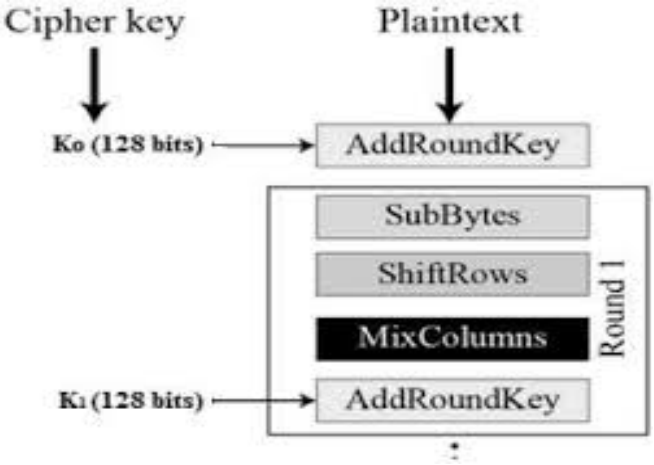
IV. MATHEMATICAL MODEL

Let S be the system Where S= I, O, P Where, I = Set of input O = Set of output P = Set of technical processes
Let S is the system
S= s, e, X, Y, AES, DD, NDD
s- Initial State: no user login • e- End state: Allow toll paid user
X- Input Login id, password, user's QR-Code
Y- Toll collection (transaction)
AES- Advanced Encryption Standard (AES) for user data encryption.
• DD- Deterministic Data: Customer information • NDD- Non Deterministic Data: QR-Code
I=user QR-Code
User QR-Code: QR-Code hold all information of user and vehicle.
O=transaction
Transaction= toll calculated according vehicle type.
P= UE, UA, VA , CT, UT

1) UE= User information encrypted by AES and stored into QR-Code.
2) UA= User Authentication= user authentication is done.
3) VA= Vehicle Authentication= vehicle authentication is done.
4) CT = calculate toll according to vehicle type
5) UT= identify user type (pass holder/ non pass holder)

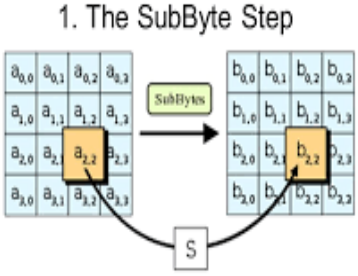
V. IMPLEMENTATION OF ENCRYPTION USING AES METHOD.

The encryption process uses a set of specially derived keys called round keys. These are applied, along with other operations, on an array of data that holds exactly one block of data;the data to be encrypted. We call this array as the state array.



A. Byte Substitution (Sub Bytes)

The 16 input bytes are substituted by looking up a fixed table (S-box) given in design. The result is in a matrix of four rows and four columns.

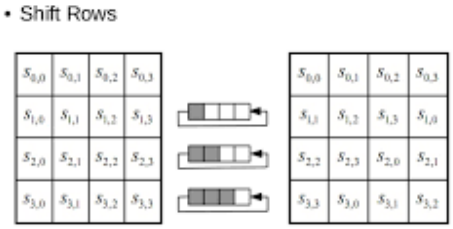


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B. *Shiftrows*

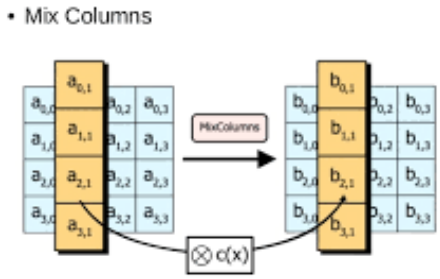
Each of the four rows of the matrix is shifted to the left. Any entries that 'fall off' are re-inserted on the right side of row. Shift is carried out as follows −

1) First row is not shifted.
2) Second row is shifted one (byte) position to the left.
3) Third row is shifted two positions to the left.
4) Fourth row is shifted three positions to the left.
5) The result is a new matrix consisting of the same 16 bytes but shifted with respect to each other.



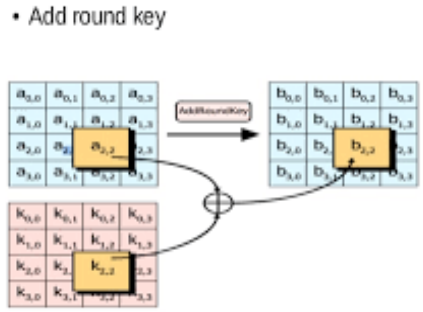
C. *Mix Columns*

Each column of four bytes is now transformed using a special mathematical function. This function takes as input the four bytes of one column and outputs four completely new bytes, which replace the original column. The result is another new matrix consisting of 16 new bytes. It should be noted that this step is not performed in the last round.



D. *Addroundkey*

The 16 bytes of the matrix are now considered as 128 bits and are XORed to the 128 bits of the round key. If this is the last round then the output is the cipher text. Otherwise, the resulting 128 bits are interpreted as 16 bytes and we begin another similar round.



VI. CONCLUSION AND FUTURE SCOPE

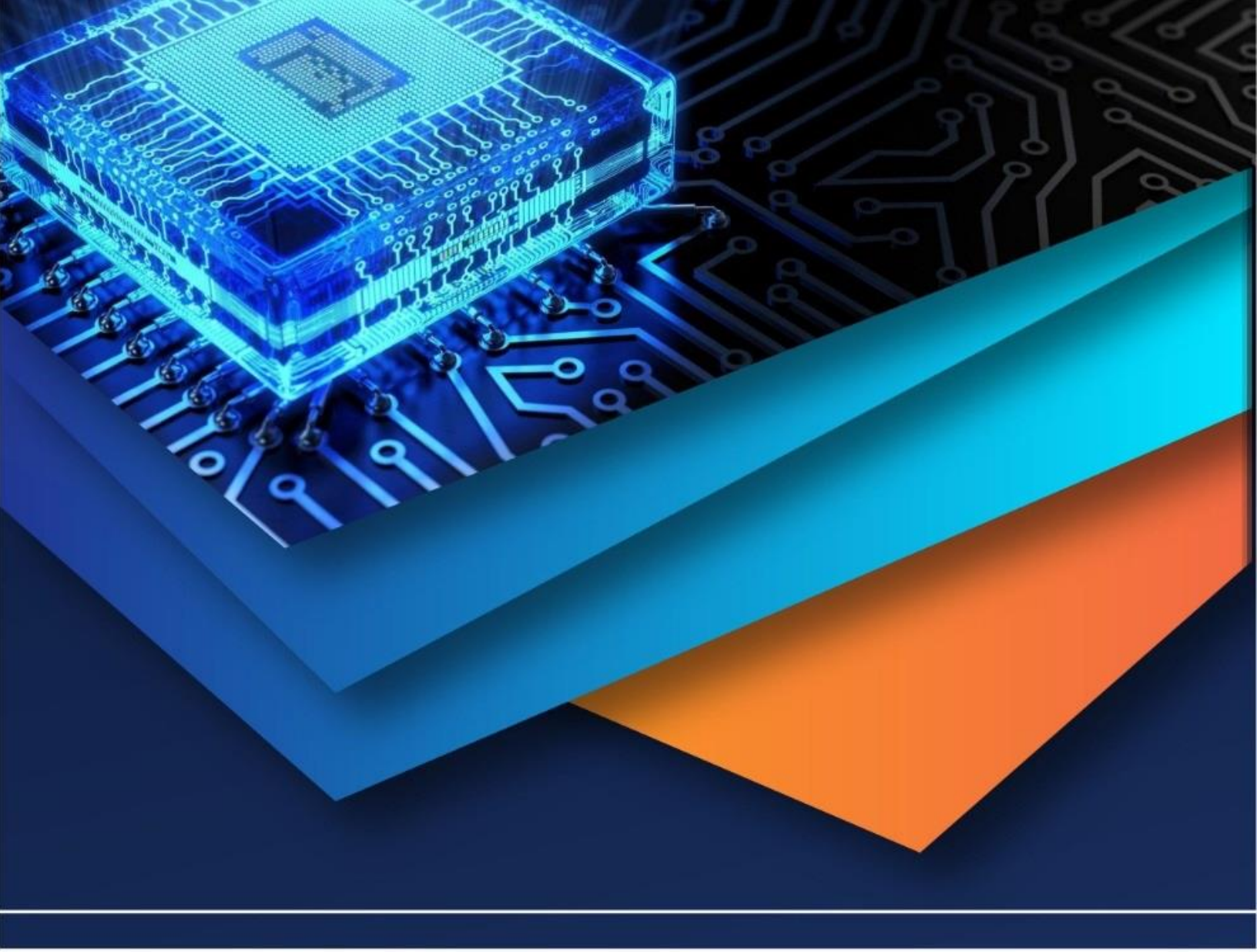
QR-Code is effective way to store information and handle stored knowledge. We propose effective and transparent toll collection system. Toll collector just need to scan QR-Code; all other operations are done automatically. Automation in toll collection reduce the time required for toll collection. Also propose system is capable of identify vehicle is stolen or not. This feature will track stolen vehicle.

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