



# Smart Toll System for Transportation and Security

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## Abstract:

Electronic Toll Collection system developed in India to save the time by collecting the toll electronically instead of manually. Since this procedure can be slow, we often encounter traffic jams at the toll plazas on busy highways. In order to provide zero delay toll collection system, so many modern toll collection systems are used like RF Tags based toll collection system, Barcode Scanner based toll collection system were used. But RF tag was not properly work under cold climate conditions. So, we had used the digital image processing to capture the image of number plate. The owner maintains a prepaid account, so that toll tax is deducted automatically from the driver's account at toll plaza. If the balance in the owner's account is low or if the vehicle is not equipped, the toll gate remains close. In such a case vehicle owner will have to pay the toll tax in cash and collect the receipt. The owner receives an SMS message on his/her mobile about the details of the payment and there is no need for him to stop the vehicle. We also know how many vehicles passing through the tollgate that will store in a database.

**Keywords:** Image processing, VNC viewer, python

## I. INTRODUCTION

Embedded systems range from portable devices such as digital factory controllers contactless and MP3 players, to large stationary installations like traffic lights, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure. There are various advantages of Toll gate; at the same time there are also disadvantages. The major disadvantages of Toll gate are requirement Manual toll collection is not reliable because any mismatch between tolls can be possible through operator. Image processing is any form of processing for which the input is an image or a series of images or videos, such as photographs or frames of video. The output of image processing can be either an image or a set of characteristics or parameters related to the image. The processing of images is faster and more cost-effective. One needs less time for processing, as well as less film and other photographing equipment. It is more ecological to process images.

## II. PROPOSED METHODOLOGY

The purpose of this project is collecting the toll according to vehicles and builds the real time application which recognizes vehicles licenses number plate at entry gate. Automatic toll collection is considered as one of the intelligent transport systems. It is aimed at making toll taxation more efficient, reliable, and safe and environment friendly. In the past, customer would have to wait at the toll booth to pay the collector, creating traffic congestion, pollution and of course of a lot of frustration.

## III. RELATED RESEARCH

Accurate detection and recognition of dirty vehicle plate numbers for high-speed applications. In this paper, an industrial, robust and reliable anpr system for high speed

applications is proposed. The main advantage of our system is its high detection and recognition accuracies on dirty plates. To achieve reliable evaluations, two new data sets were created and used in this paper: one for violation detection called "crossroad data set" and the other for vehicle counting in highways called "highway data set." [1]. The forecast model calculates the future status with high accuracy according to historical status, which helps officials and drivers be aware of the traffic condition in advance [2]. We have presented a novel collision detection and signal recovery algorithm based on the analysis of the  $I-Q$  characteristics of the received collided signals [3]. A traveller will be able to pay the toll while in motion using RFID communication technology. Through this process of toll collection will save time, effort, and man power [4]. The emergency services vehicles such as ambulance and fire station vehicles exempt from toll collection. This kind of toll collection system can save valuable time [5]. The account information of respective person is provided in the R.T.O. database. The system can enhanced for anti theft environment by identifying the unauthorized users [6]. This paper, from the view point of the economic cost of highway toll station, establishes the queuing model based on the arrival rate of traffic flow at highway toll station in inbound and outbound directions [7]. This system will ensure faster commutation on highways [8]. A system to warn e-Toll Card user that their funds are running out, faster transaction times for e-Toll card, and making the OBU have lower prices and easier to purchase.

## IV. SYSTEM DESIGN

### Step 1: Acquisition of Image.

In this first step image is captured or acquired from digital camera. Image should be taken from angle fixed which is parallel to the horizon. Vehicle should be stationary or at a fixed angle in this case. The capturing of an image using electronic devices such as optical (digital/video) camera can be used to capture the acquired image. For this algorithm to work, vehicle images will be taken with a digital camera. In this

project pre-captured image is taken. The images will be stored as colour image JPEG format.

**Step 2: Conversion of Image into Gray Image.**

In this step the image processing works on Gray level image, for pre- processing image and identifying the required given information. In this step colored image captured from the camera is converted into Gray scale image.

**Step 3: Extraction of the required image from region of interest.**

From the above segmented image, the region with maximum histograms value is taken as the most probable region of extraction for number plate. Among the regions, the region with highest horizontal histogram and vertical histogram value are identified. Then the region is considered as highest possibility of containing number plate and is then extracted from the required image

**ALGORITHM**

- Step 1: With the help of a camera, the number plate of the vehicle will be captured.
- Step 2: The number plate of the vehicle will be processed using an image processing technique.
- Step 3 : Once the license number is extracted from the overall image, it will be compared and searched in the centralize database and the respective vehicle owner’s details will be fetched.
- Step 4 : Along with the details OTP sent to owner
- Step 5 : If the entered OTP was correct
- Step 6 : Amount will be deducted
- step 7: Else the toll amount will not be deducted from the vehicle owner’s bank account.

**V.RESULTS AND OUTPUT**

The simulation results showed that the proposed algorithm of Number Plate Recognitions using OCR is executed well. Thus a system for Image Processing Based Automatic Toll Booth in the Indian Condition which is very secure and highly reliable and can be obtained easily. It can used for the remove all drawbacks in the current system such as time and human effort and it also doesn’t require any tag only required best quality camera and fixed font number plate. In the Future Work one must use the Billing System can be implemented. This system can also be made Online which needs a huge Database.

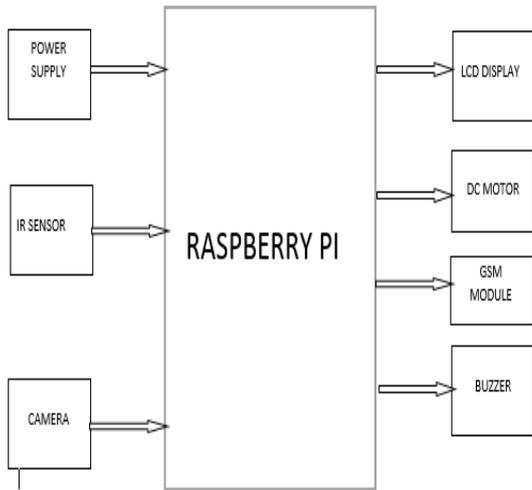


Figure.1. Block diagram

**ADVANTAGES OF PROPOSED SYSTEM**

- Reduces Traffic near the toll checkpoint areas.
- Maintains the record of the total toll collected.
- Reduces the overhead of collecting physical cash from commuters.
- Reduces fraudulent behaviour at toll checkpoints.

**FLOW CHART**

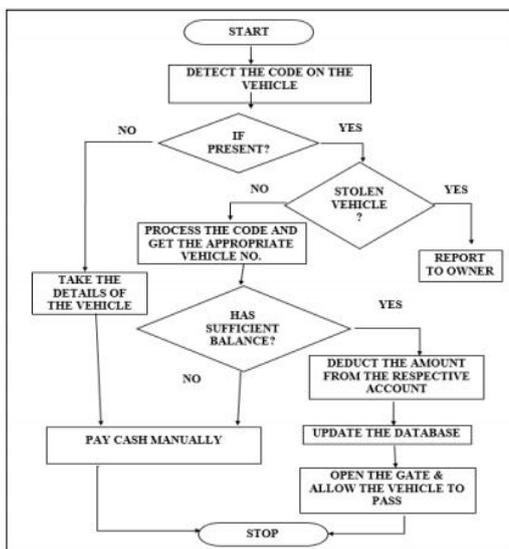


Figure.2. Flow Chart

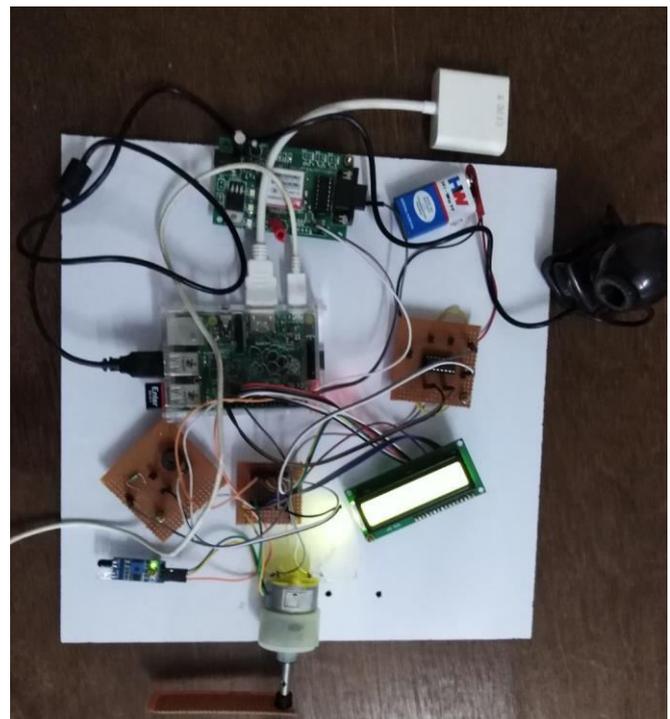


Figure. 3. Module setup

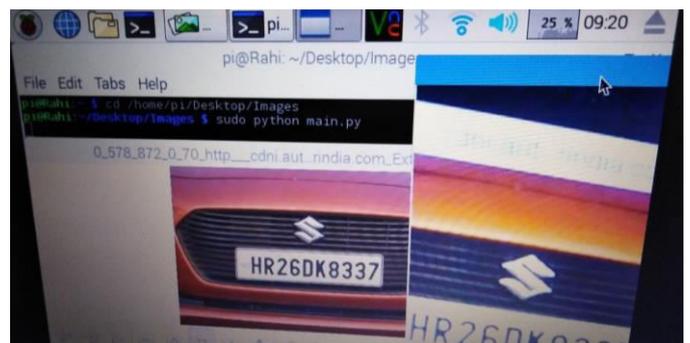


Figure.4. Verifying vehicle number

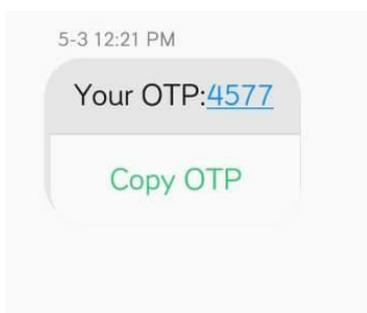


Figure.5. Message to user

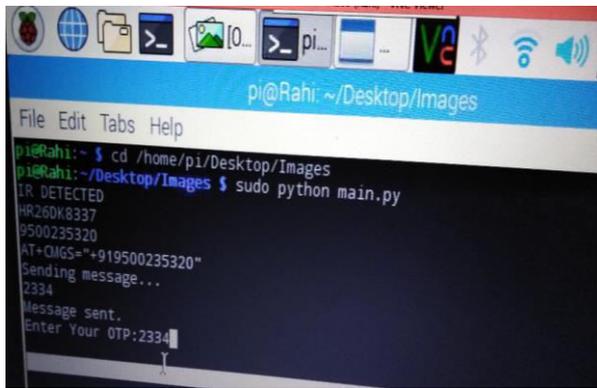


Figure .6.OTP Verification



Figure.6. Webpage output

**VI.CONCLUSION**

Our system is a user friendly toll fee method which can save time and reduce traffic congestion at toll gates and provide solution for users to reach their destination without wastage of time. It gives the toll authorities the flexibility to set variable pricing for toll services and thus a fair policy of tax collection can be followed. This way there is no loss incurred by a person carrying a vacant vehicle. With the hike of fuel prices in mind, consumption of fuel is also considered here as the deceleration, acceleration and idling is completely eliminated. Here there is no cash transaction for the toll lanes, so cash handling is reduced. Thus difficulties with cash handling are eliminated and this way aid in enhanced audit control by centralizing user accounts. Information such as vehicle count over the time of the day, date, time etc can be obtained due to the deployment of this technology. This helps in making decisions regarding the pricing strategies for the toll providers. It also helps planner to estimate the travel time that aid in designing decisions.

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