NOVEL ONLINE VEHICLE TOLL PAYMENT SYSTEM FOR INDIAN NATIONAL HIGHWAYS

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Abstract -- In this paper, a design for automatic license plate number Recognition system is to be developed. A novel genetic algorithm is introduces to detect and extract the license plate . This performs two level of segmentation process. Then Connected Component Analysis technique is used to extract individual characters i.e. numbers and alphabets in the image. Then followed by template matching method with loaded database, where the database consist of 10 to 15 image samples of all possible numeric values and alphabets of different size and font. As a result of Template matching system we will get the recognized numbers from image to Text format.

Key words -- License plate Recognition system, Genetic algorithm, Connected component analysis, Template matching.

I.INTRODUCTION

A toll road is also known as turnpike or toll way. Toll is payable at public road. The passengers are charged for using the road. Fee collected at toll is used for extending the road further and to maintain the existing road, this comes under the maintenance of national highway authority of India. The amount of the toll usually varies by vehicle type, weight, and number of axles, with trucks charges the highest. This leads to difficulties in case of emergency. Existing system on toll gate can be further improved by introducing the online toll payment. In this trend-setting era, smart phone plays a vital role[1]. Everywhere, whether it is a gadget, banking or travelling, Android App is easiest and fastest way of getting thing done in this modern busy life. Likewise such an app can also be introduced for online toll payment to reduce the traffic at toll gate. This idea paves way for better commutation.

With growing number of vehicles on boulevards, it is getting hard to physically maintain laws and action rules for smooth development stream. Toll-slows down are based on turnpikes and ceasing structures, where the auto needs to stop to pay the toll or halting fees[2]. In like manner, Traffic Management systems are acquainted on turnpikes with check for vehicles moving at speeds not permitted by law. Each one of these systems have a degree of progress. In the point of convergence of each one of these structures lies a vehicle. In order to robotize these strategies and make them more fruitful, a system is required to successfully recognize a vehicle. The basic request here is how to recognize a particular vehicle? The prominent reaction to this request is by using the vehicle's number plate. Vehicles in each country have an exceptional allow number, which is made on its tag [3]. This number remembers one vehicle from the other, which is useful especially when both are of same make and model. A mechanized system can be realized to perceive the tag of a vehicle and focus the characters from the district containing a tag. The label number can be used to recoup more information about the vehicle and its proprietor, which can be used for furthermore getting ready. Such a robotized structure should be little in estimate, helpful and have the ability to process data at sufficient rate [4].

This paper has been intended to distinguish a tag from a picture given by a camera. An effective calculation is created to identify a tag in different luminance conditions. This estimation isolates the label data from a photo and gives it as a commitment to the period of Car License Plate Recognition. This count is downloaded onto littler scale controller pack like Raspberry pi [5]. The picture of a vehicle is given as a contribution from the camera. Extricated picture of the number plate can be seen on TV for check purpose [6]. The extent of this undertaking is to distinguish the tag from the given picture and watch the yield on TV. This undertaking can fill in as a base for future upgrades in the field of picture preparing, particularly in tag extraction and plate number recognition [7].

Charging Methods:

New technologies open up possible ways to implement road toll policies by using certain concepts.

There are three stages on implementation:

- Time Based Charges and Access Fees
- Motorway and other Infrastructure Tolling
- Distance Covered

(I) Time Based Charges and Access Fees:

A road user has to pay the toll fee for certain period of time to use infrastructure tolling to access a restricted zone [8].

(II) Motorway and other Infrastructure Tolling:

There may be different types of tolls like, bridge, tunnel and mountain pass, hence the charging rates may differ. The tariff may change according to the toll.

(III) Distance Covered:

This system fixes the charges according to the distance covered by the vehicle routes used to reach the same destination place [9]. An open toll leads to more confusion, Toll collector should stop the vehicle to check the toll ticket, when the vehicle moves near the toll, the toll gate closes, after payment, and the toll is opened. A printed ticket is given to the driver [10]. The disadvantage on hand payment leads to time delay. Hence Traffic Jam increases and faces many problems in case of emergency situations. A RFID Tag is used for the information of the vehicle owner [11]. Nowadays a Driver can use his Credit/Debit card, Hence Once he pays the amount it is automatically debited from his account and a SMS or a printed ticket is given.

Existing license plate recognition methods combines multiple methods together which leads in long computational time which may be reduced by applying simple algorithms, still result will be greatly degraded by poor and noisy images [12]. This means the vehicle image should be captured in such a way that the letters and numbers could be visible clearly for segmentation. First, the original car image in color is converted to black and white image gray-scale image [13]. The original image is converted to gray-scale image which is in high contrast as shown above. Now, we need to identify the location of the number plate horizontally in which row it's present. The letters and numbers are placed in the same row [154.

II. PROPOSED SYSTEM

2.1 Fundamentals of Image Processing

A photo is used to pass on supportive information in a conspicuous setup. A photo is just a strategy of humble segments in a two-dimensional plane. These humble parts are called Pixels. Innumerable combine to outline a photo, paying little mind to whether little or immense. Each pixel addresses certain information about the photo, like shading, light power and luminance. A broad number of such pixels merge together to shape a photo. Pixel is the basic segment used to portray a photo. By and large, every pixel in a photo is addressed in either RGB (Red Green Blue) course of action or YCbCr outline. A RGB picture can pass on picture parts like shading, wonder et cetera through mix of R,Gand B planes. Each part eats up certain memory space in the midst of picture taking care of. A YCbCr picture, is the depiction of every pixel as a mix of Y and Cb/Cr regards. Here, Y for luminance, that portrays light power, and Cb/Cr for chroma fragment, that describes shading information for a photo [35]. YCbCr parts of a photo can pass on satisfactory proportion of information better than anything RGB, with less memory space. This is an important favored point of view nowadays, as most of the applications require satisfactory information at quick and less storage[15].

2.2 RGB Format

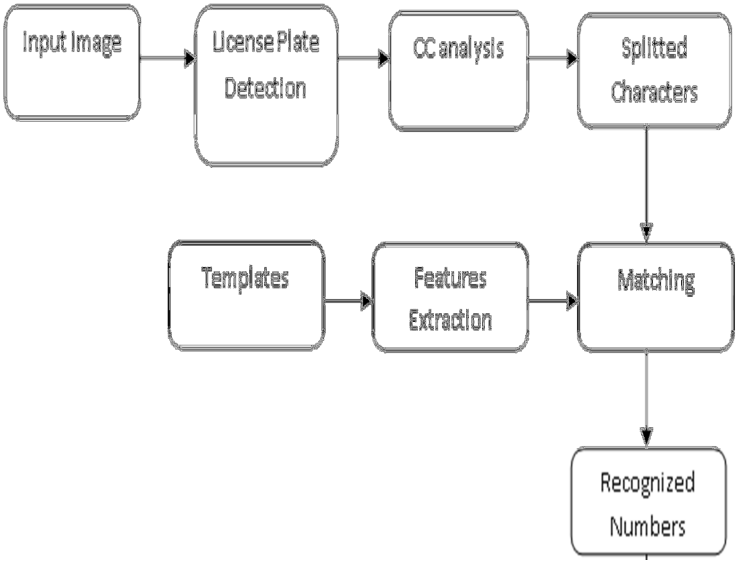
In a RGB picture, every pixel is addressed by three portions R, G and B. Each one of these sections requires something close to 8 bits for their ability. At the point when all is said in done, a lone pixel may require upto 8 * 3 bits for its amassing. The estimation of R, G and B each range from 0-255. An estimation of (0, 0, 0) addresses a dim pixel, (255, 0, 0) addresses a red pixel and (0, 255, 0) addresses a green pixel. Thusly, 8 bits are required to

store a motivator for a single part.

2.3 YCbCr Format

Instead of RGB mastermind, the YCbCr compose is available with various kind of interleaving. For example, a 4:2:2 YCbCr compose recommends that a single pixel is addressed by two portions, Y and C. Cb and Cr parts are interleaved among the pixels. So if one pixel is addressed by a mix of Y and Cb, the adjacent pixel will be addressed by a blend of Y and Cr. Characteristics for Y, Cb and Cr vacillate from 0-255. Henceforth, to store a single pixel, the proportion of limit required is 8 * 2 bits, which is less stood out from that required by RGB outline. For this endeavor, Texas Instrument's EVM320DM6437 pack is to be used for label acknowledgment. The unit contains internal pads to store the moving toward housings of video.

Proposed system makes sure that the data from the captured license plate image license plate is converted to text format accurately.



III. SIMULATION AND RESULTS

The entire process has been designed in MATLAB 2007a with MATLAB programming language. Graphical User Interface has been created for the code.

The likelihood to change over a tag acknowledgment framework to a business application depends on exactness of recognizable proof permit number and running time of the framework. This general framework is extremely secluded in that each utilitarian square can be inspected and broke down freely of the others. This turns out to be extremely helpful for profiling and advancing the general framework. Our investigation of the framework is done on a for every picture premise. Despite the fact that we look at every part of the general framework, enhancements

where for the most part scientific activities are focused on those squares where the info pictures are handled. These squares are executed once for every one of the information pictures. The figure.1 shows the input image to the License plate recognition system

Figure.1.Vehicle image with license plate

Figure.2.output of level-1 segmentation process

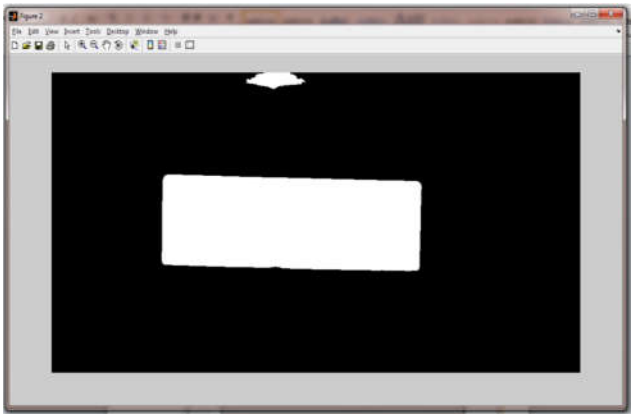


Figure.3.Holes filled to the white or yellow component

Figure.4. segmented license plate image

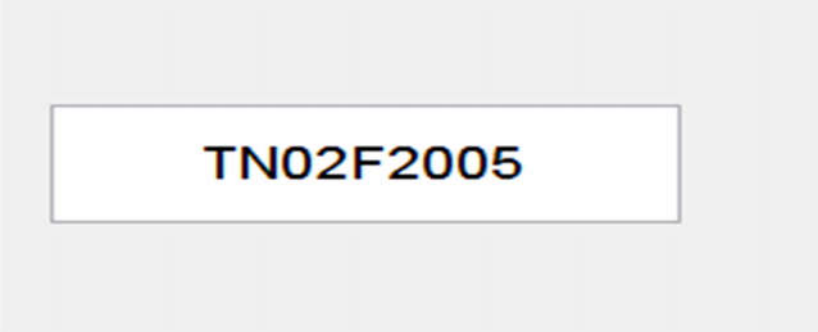


Figure.5.Recognized license number

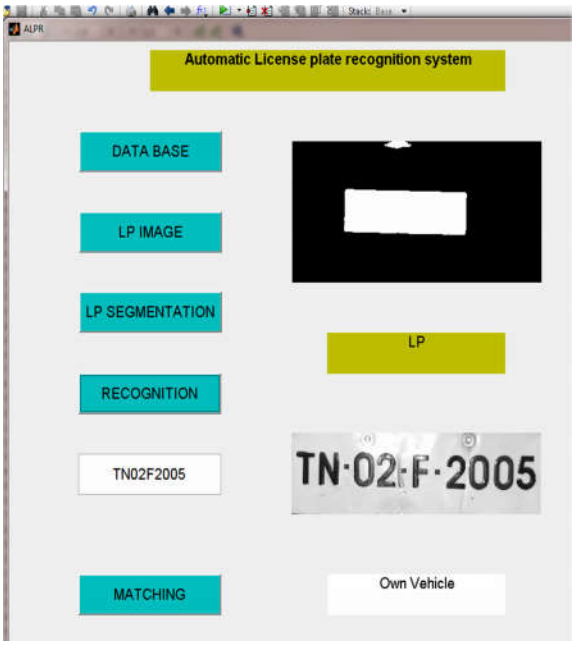


Figure.6. Final output on GUI.

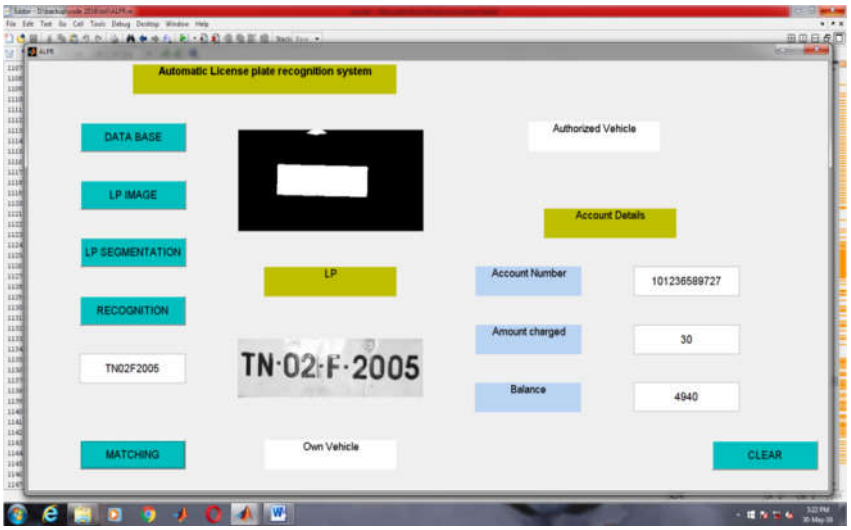
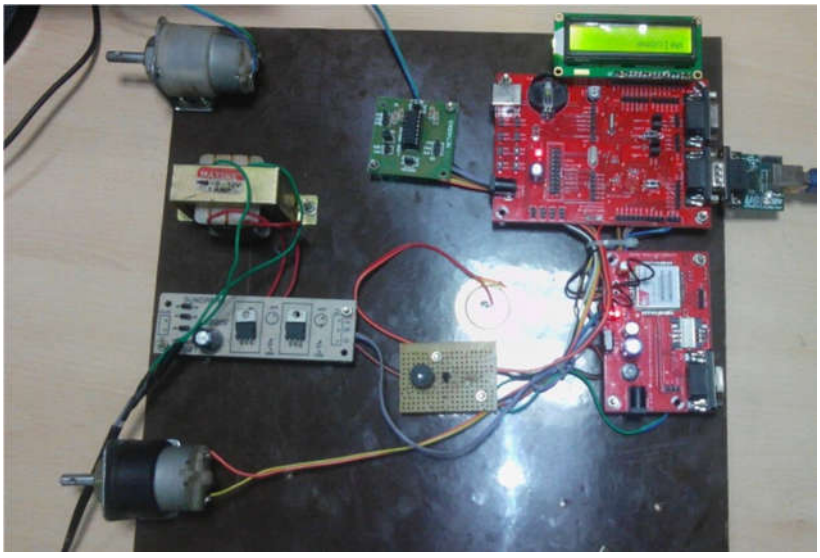


Figure.7. Account detail

IV. APPLICATION IN HARDWARE

Whenever an vehicle enters a toll plaza. The camera installed there captures the image of vehicle along with its license plate. License plate recognition has been performed using image processing part and authentication is done. This authentication and balance details have been sent to the processor through serial communication for further process. When an authorized vehicle enters the toll plaza money has been charged else buzzer starts and gate will not be opened. Whenever the driver tries to break up the gate this has been sensed through a piezoelectric sensor which invokes spikes to puncture the vehicle and stop it.



V. APPLICATIONS OF ALPR SYSTEM

1. Parking :- The NPR is used to automatically enter prepaid members and calculate parking fee for nonmembers.
2. Access control :- A gate automatically opens for authorized members in a secured area, thus replacing or assisting the security guard.
3. Tolling :- The car number is used to calculate the travel fee in a toll-road or used to double check the ticket.
4. Border Security :- The car number is registered in the entry or exits to the country and used to monitor the border crossings.
5. Traffic Control :- The vehicles can be directed to different lanes according to their entry permits. The system reduces the traffic congestions and number of attendants.
6. Airport Parking :- In order to reduce ticket frauds or mistakes, the NPR unit is used to capture the number plate and image of the car

VI. CONCLUSION

Thus an automatic License plate recognition system has been developed. Here segmentation of license plate has been developed using a novel Genetic segmentation algorithm, which performs segmentation of license plate as two level process. Then Connected Component Analysis technique has been used to extract individual characters of the license plate image finally followed by template matching with loaded database. Finally we have Extracted license plate number in text format from the captured vehicle image.

Significant execution upgrades are normal through further examination of streamlining systems focusing essentially on memory issues. Most math activities and memory gets to happen utilizing information put away in outer memory, which is much slower regarding access than inward memory. Buffering portions of outer memory into interior memory can make speed changes. The utilization of interior memory paging will most likely empower upgrades in execution. This has been demonstrated with earlier work in cover sifting streamlining systems.

The exactness of the tag acknowledgment framework was assessed by its execution on an arrangement of test input pictures. The info pictures are with auto pictures alongside tag, the pictures are of posterior of the auto. We quantified the achievement rate of the framework by the rate at which it accurately distinguished the tag and its individual alphanumeric characters. All in all, numerals were significantly less demanding to recognize than letters. This is undoubtedly because of the bigger contrasts (less potential uncertainty) found between numerical layouts. Wrong recognizable proof of the tag is described by a mistaken distinguishing proof of the spatial directions that characterize the area of the tag district. This incorporates an entire miss (for instance, recognizing a fix of black-top as a tag) or a fractional miss where just a bit of the objective tag was distinguished.

VII. Future work

Utilize further developed device and picture handling methods to enhance the frameworks precision. For instance, we could utilize paired morphology to dispose of edges that are more slender than the characters of the tag. We get a kick out of the chance to Increase the goals of the pictures. At present, the main computerized camera we could get limits us to 480x640 and variable edge and separation with non-Pennsylvanian License Plates.

VIII. REFERENCES

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