OCR For Toll Gate and Theft Detection

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***Abstract*—Number plate recognition technique can be used in the toll gate to identify the vehicle and to collect the toll. Varies number plate recognition techniques are present today. An improved system is described which apart from collecting the toll; it will check the presence of theft vehicle. OCR technique is used to identify the number. We can report the theft my sending the vehicle number to a specified. This system has many advantages like theft detection, less man power, user friendly, vehicle logging and less processing time.**

***Keywords*—: GSM, OCR, Toll gate, Theft detection**

I. INTRODUCTION

ALPR (automatic license plate recognition) plays an important role in numerous real-life applications, such as automatic toll collection, traffic law enforcement, parking lot control, and road traffic monitoring. ALPR recognizes a vehicle's license plate number from an image or images taken by either a color, black and white, or infrared camera. It is fulfilled by the combination of a lot of techniques, such as object detection, image processing, and pattern recognition. ALPR is also known as automatic vehicle identification, car plate recognition, automatic number plate recognition, and OCR (optical character recognition) for cars. The variations of the plate types or environments cause challenges in the detection and recognition of license plates. The ALPR system that extracts a license plate number from a given image can be composed of four stages. The first stage is to acquire the car image using a camera. The parameters of the camera, such as the type of camera, camera resolution, shutter speed, orientation, and light, have to be considered. The second stage is to extract the license plate from the image based on some features, such as the boundary, the color, or the existence of the characters. The third stage is to segmentthe license plate and extract the characters by projecting their color information, labeling them, or matching their positions with templates. The final stage is to recognize the extracted characters by template matching.

Now a day, lots of man power is needed in toll gates. In a single gate we need a worker to collect the cash and another one to operate the gate. This can be avoided by making the toll gate automatic. . The system detects the vehicle first and then captures the image of the front view of the vehicle. Vehicle number plate is localized & characters are segmented. The system is designed for gray scale images so it detects the number plate regardless of its color. Template matching technique is used for character recognition. The resulting vehicle number is then compared with the available database of all the vehicles so as to come up with information about the vehicle type & to charge toll tax accordingly. If it is not a theft vehicle the toll money is reduced the gate is opened. The bill is sent to the driver's mobile through the GSM facility. If the same vehicle is returned before a specific time, a consideration is given to the driver. If a theft vehicle is detected the gate won't open and a message is send to the nearby police station. We can report the theft my sending the vehicle number to a specified number. This will get updated in the database which can also be monitored by the police. Thus the vehicle number is quickly updated in the data base and theft detection is improved. An effective vehicle logging system is possible in this system. This system is implemented on toll gate for its automatic operation and vehicle theft detection. OCR technique is used to identify the vehicle number.

II. PROPOSED SYSTEM

This system is implemented on toll gate for its automatic operation and vehicle theft detection. The system detects vehicle theft by checking the license plate number. OCR technique is used to identify the vehicle number. OCR technique is implemented in LabVIEWsoftware. The block diagram of the proposed system is shown in Figure 1.When a theft vehicle is identified an alert message is sent to the nearest police station and the gate won't get opened. Otherwise the toll amount is deducted from the data base and the gate is opened. A bill is sent to the vehicle owner after deducting the amount. If our vehicle is found theft we can immediately report it by sending an SMS to a specified control number. This number is then updated to the theft vehicle list. This reduces the time lag.A prototype model of the system is made and is shown.

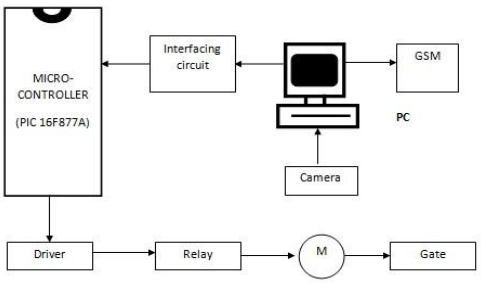

Fig.1 Block diagram

III. HARDWAREDESCRIPTION

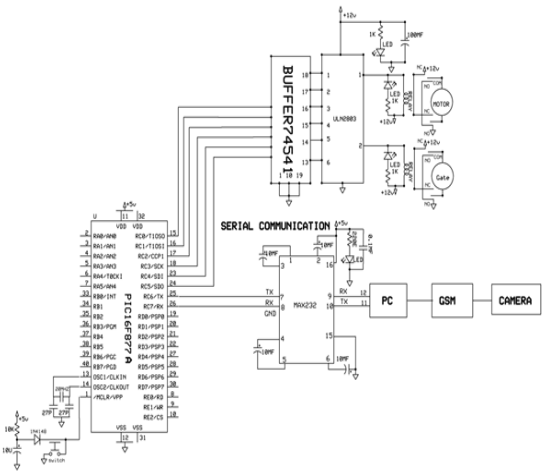

Fig.2 Circuit diagram

The circuit diagram is shown in Fig 2. It consists of:

- GSM
- Interfacing circuit.
- Micro controller.
- Driver.
- Relay.
- Camera.
- Motor.

GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. It is used here to receive message report of the theft vehicle and to send message to the nearest police station. It is also used to send the bill amount to the owner.

PIC 16F877A is used as the microcontroller. It controls all the operation. The code for the gate operation is written here. We write the code to open the gate when controller receives 2 and close the gate when controller receives 1.

Interfacing circuit is essential as we are using serial communication. MAX232 is used for interfacing circuit.The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits.

A ULN2803 is an Integrated Circuit (IC) chip with a High Voltage/High Current Darlington Transistor Array. It is used as the driver IC. It allows you to interface TTL signals with higher voltage/current loads.

A relay is an electrically operated switch. It is used to operate the motor.

IV. SOFTWARE DESCRIPTION

The software part is done in LabVIEW. The front panel is shown in Fig 3. At first we need to select the com port of the GSM and the circuit. A database is used store the details if the vehicle.

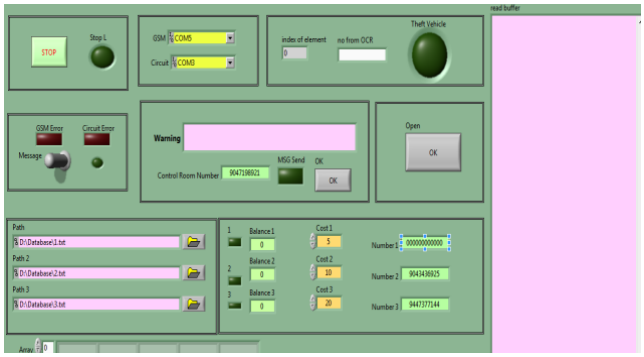

Fig.3Main Front panel

To identify the vehicle front panel shown in Fig 4 is used. To identify the vehicle number we must create a character set. That is we means to train each character and number and store it. And before running the application we must load the character for number identification.

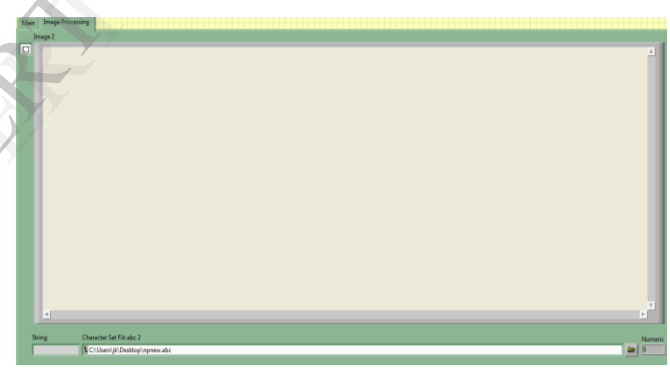

Fig.4 Image Front panel

The logic of front panel is done using the LabVIEW block diagram. Image processing block diagram is show in Fig 5. Vision acquisition block is used to select the camera input. The character set is loaded and the vehicle number from the image is properly identified. We specify a region of interest (ROI)from which the character is read.

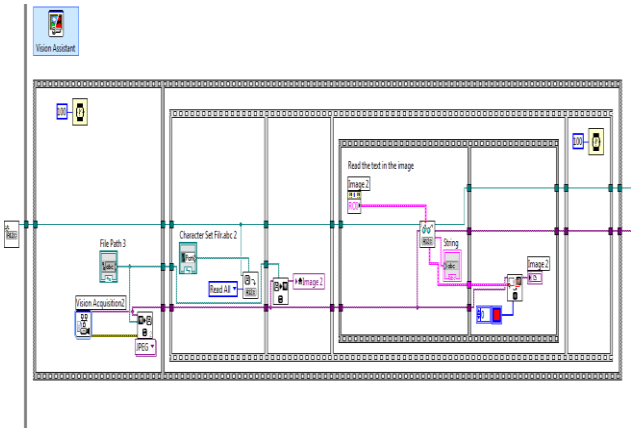

Fig.5 Image block diagram

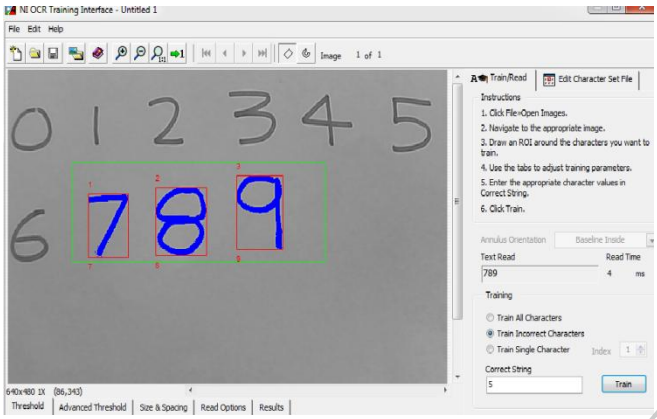

Fig.6 character training

Vision assistant is used to create the character set. Each character is trained as shown in Fig 6. Our capture efficiency increases with how well we train the characters. We can train characters in dark background or in light background.

An array is used to save the theft reported vehicle number. If we SMS the vehicle number it is updated in the array. The vehicle number after identification is checked for theft. Its logic is given in Fig 7. A search block is used to search the array and the index of the element is checked with default value to detect the number.

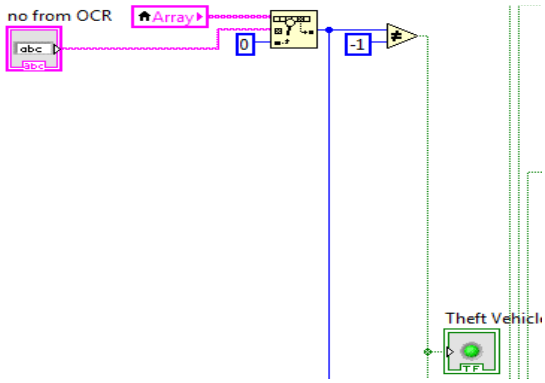

Fig.7 Theft detection logic

For serial communication a port called VISA is provided by LabVIEW. So we need to declare two VISA ports, one for GSM communication and one to communicate with the circuit as in Fig 8. We need to provide suitable parameters to the port like baud rate. It facilitates functions like VISA write and VISA read to read and to write from the port. This port number should be specified at the beginning.

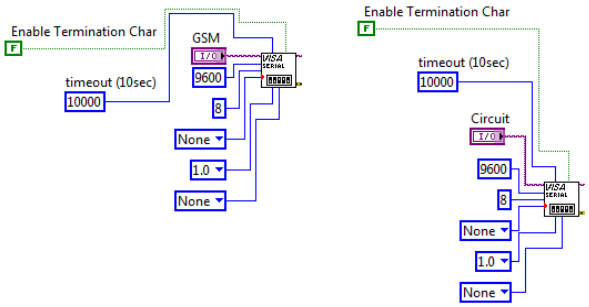

Fig.8 VISA initialization

In microcontroller, code is written so that if it gets value 2, the gate must be opened and if it get 1 gate is closed. So we if detected vehicle is not a theft vehicle, 2 is send through VISA port and after a time delay 1 is send to close the gate as shown in Fig 9. The corresponding value is written to the port using VISA write.

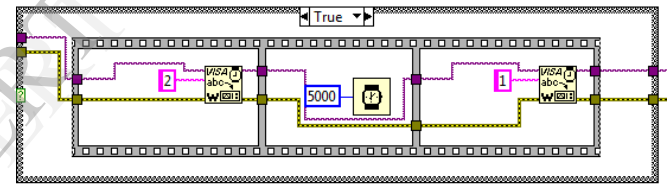

Fig.9 VISA write

V. EXPERIMENTAL RESULTS

When vehicle arrives its number is detected as shown in Fig 10. If its not a theft vehicle, the gate is opened and the bill is send to the vehicle owner number after reducing the amount as shown in Fig 11,12 and 13.

Fig.10 Number detection

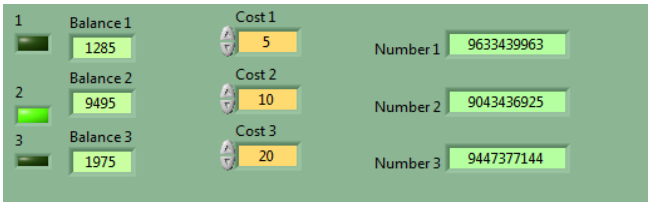

Fig.11 Amount deduction (1)

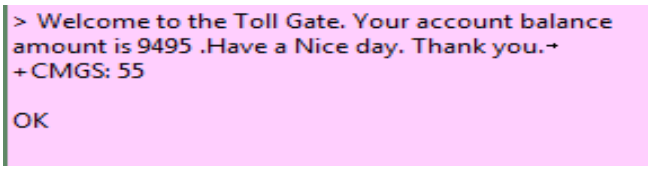

Fig.12 Bill

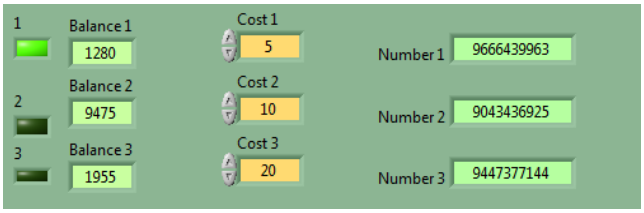

Fig.13 Amount deduction (2)

When a theft vehicle is detected it will be indiacated and a message is sent to the nearest police station as shown in Fig 14. A warning is shown and the lights will glow to indicate the presence of theft vehicle.

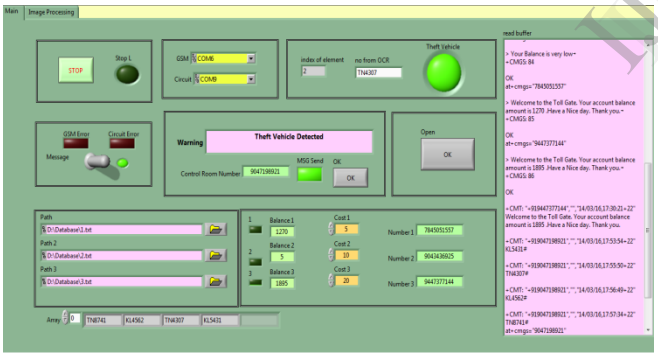

Fig.14 Theft detection

To report theft vehicle, we need to send the vehicle number with # at the end. It will get updated in the array as shown in Fig 14. When the vehicle arrives , its number is compared with the numbers in the array to detect the presence of atheft vehicle. When the amount is low an indiaction is given as shown in Fig 15. An SMS alert is also given. If there is an error in the circuit or in the GSM it is also indicated. For opening the gate at the time of emergencies like fire force and ambulance, an open switch is provided.

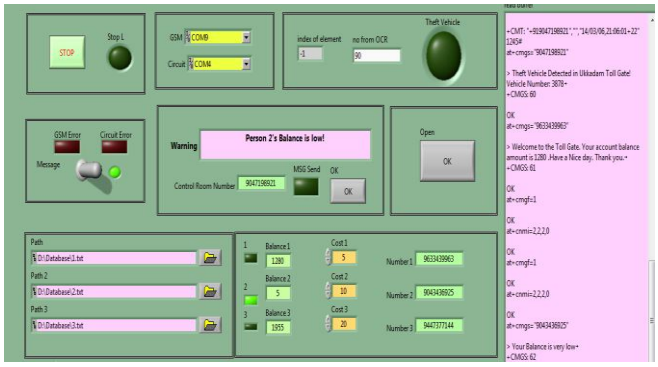

Fig.15Low amount indication

VI. CONCLUSION

This paper describes an effective toll gate system which also provides theft detection. The vehicle number is detected by OCR technique. A properly trained character set is used for this. This number is then checked for theft and if it is a theft vehicle, the gate won't be opened and an alert is given to the nearby police station. If not the amount is deducted from the account and the gate is opened.This technique replaces the older toll gate with more man power and with no additional features.

VII. FUTURE SCOPE

Future work in this domain may include implementation of the system in traffic signals and parking lot. An effective logging system should also be provided to track the vehicle. This can reduce the amount of vehicle theft.

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