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Automatic Gate Control System Based On Vehicle License Plate Recognition

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***Abstract*---this paper discussed on automatic gate control system based on vehicle license plate recognition. The aim of this research is to develop and implement an automatic gate control system that will increase convenience and security at entrance of all the important places that require protection and Security. The auto gate control will be able to works automatically without need human beings and also the system will be able to recognizes license plates from cars at entrance gate and take an action to let cars enter or not. The system based on PIC microcontroller and regular PC with video camera, catches video frames which include a visible car license plate and processes them. The proposed system has been implemented using Matlab, Proteus & Micro C the recognition is about 98% vehicles shows that the system is quite efficient.**

Keywords – Automatic gate control system,vehicle license plate recognition,OCR(Optical Character Recognition), Segmentation, Normalization, Matlab.

I. INTRODUCTION

Almost everything in the modern world is going automatic;we have built this project to increase the convenience and security at the entrancegate.

Vehicle license plate recognition is an image-processing technology used to identify vehicles by their license plates. This technology can be used in various security and traffic applications, such as finding stolen cars, controlling access to car parks and gathering traffic flow statistics[1]. The purpose of this paper is to develop an automaticgate control application which recognizes license plates from cars at entrance gate and take an action to let cars enter or not. The system, based on PIC microcontroller and regular PC with video camera, catches video frames which include a visible car license plate and processes them.

II. VEHICLE LICENSE PLATE RECOGNITION

This is the main part of the project, which we have used Matlab software to implemented our algorithm.

This Recognition of any License Plate Recognition system is the effectiveness of its algorithms.

As a whole, a series of six primary algorithms are necessary for a License Plate Recognition system to be successful which are:

1. License PlateLocalization
2. License Plate Sizing and Orientation
3. Normalization
4. Characters Segmentation
5. Optical character recognition (OCR)
6. Syntactical /Geometrical analysis [2]

III. METHODOLOGY

The system is divided into two parts:

A. Entrance Gate.
B. Exit Gate.

The entrance is divided into sub-systems which are LCD display system, image acquisition and plate number recognition.

Firstly, the car will stand in front of the barrierthen IR sensor send signal to the microcontroller and it will send message to the matlab,then LCD will display a Welcome Message.

Secondly, the image(license plate) acquired from the hardware components by the Camera will be analyzed in data analysis part where mostly done in Matlab.Then theanalyzed image will be compared with the information stored in the database, if this image is matched with the information stored in the database, then Matlab send massage to the microcontroller to open the barrier gate and after some time delay thebarrier gate will be close again. But if the image doesn't match with any image from those images in the database then ,the Matlab will send a message to the microcontroller, and the microcontroller will turn on alarm and LCD will display amessage "you are not allowed to enter, please go back ". All the displayed are the output from the microcontroller.

The exit part is very simple compare with entrance, which is when the car stand in front of the barrier, IR sensor send signal to microcontroller and it will open the barrier gate,and after some time delay, the barrier gate will be close again.

IV. CIRCUIT EXPLANATIONS

Our project has some parts which are:

a) Software program and camera

b) Sensor section

c) Indictor section

d) Motor section

e) Display section

Program is written using PIC16f877 microcontroller.

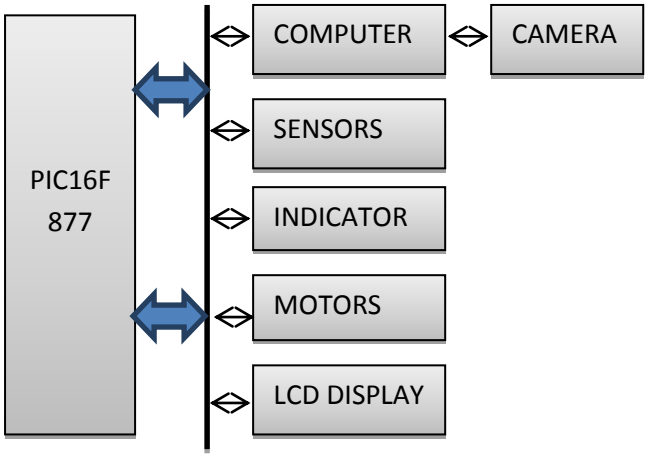

Fig 1.Block diagram of automated gate

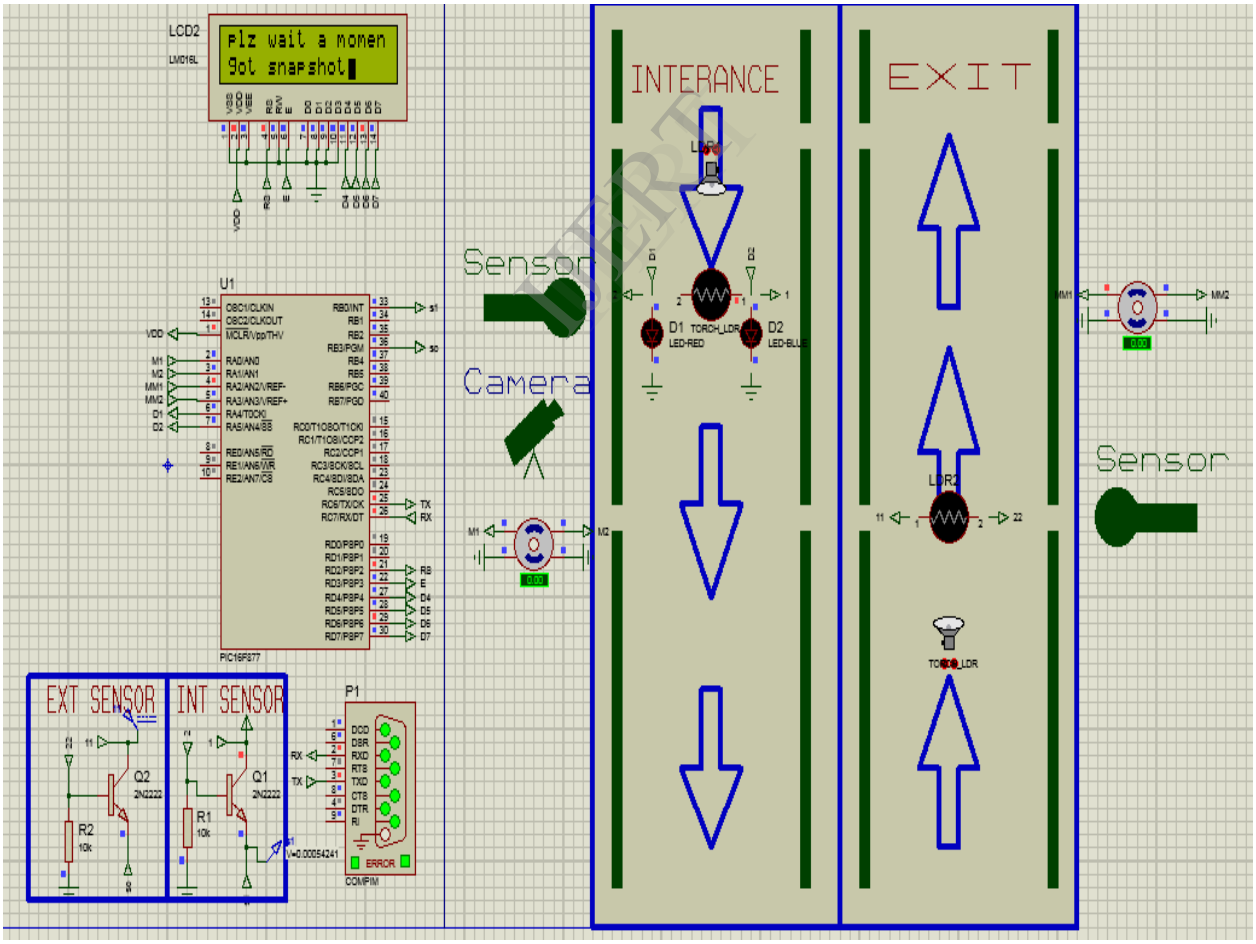

Fig 2. Automatic Gate Control Circuit Diagram

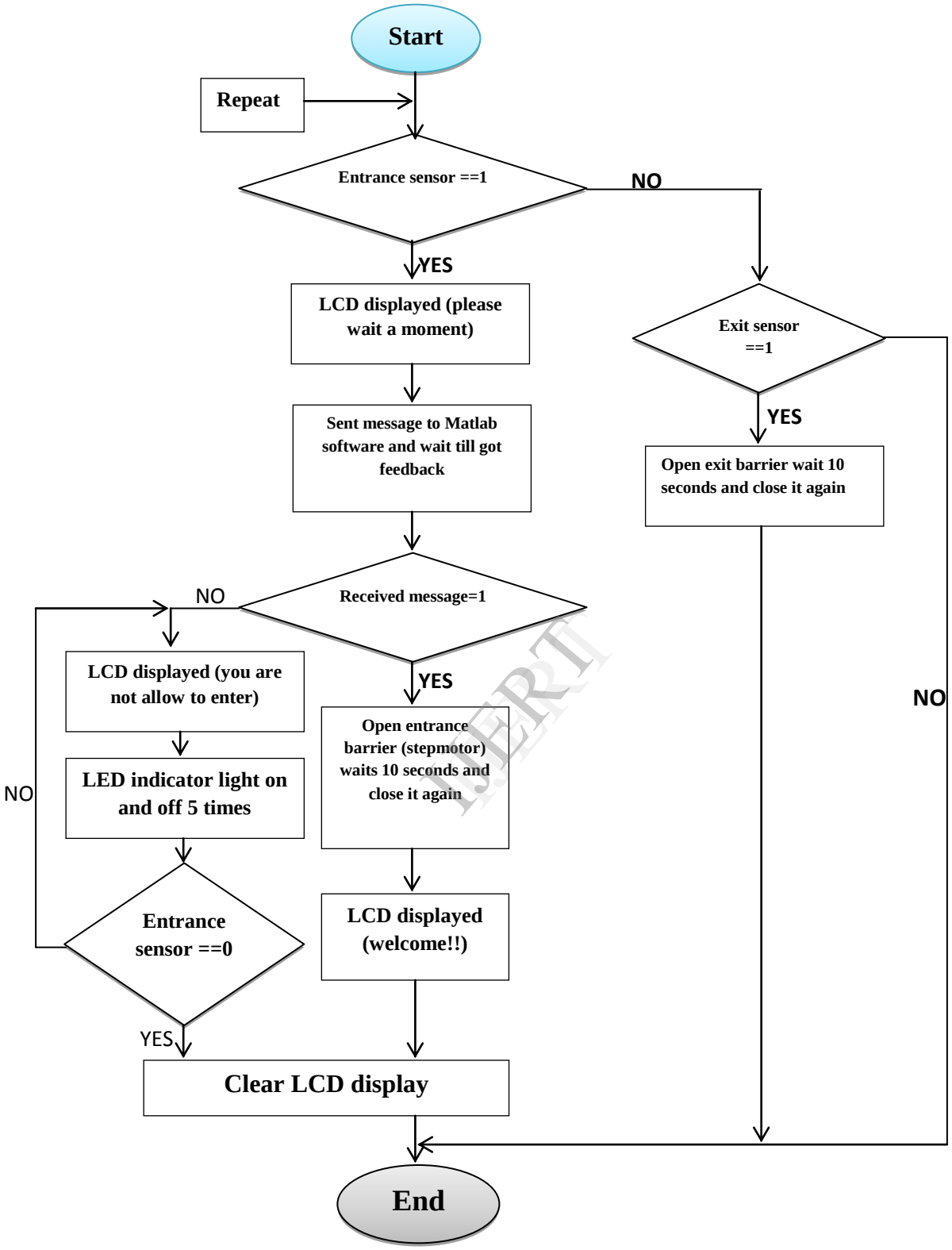

Fig 3.Flowchart for the microcontroller subsystem

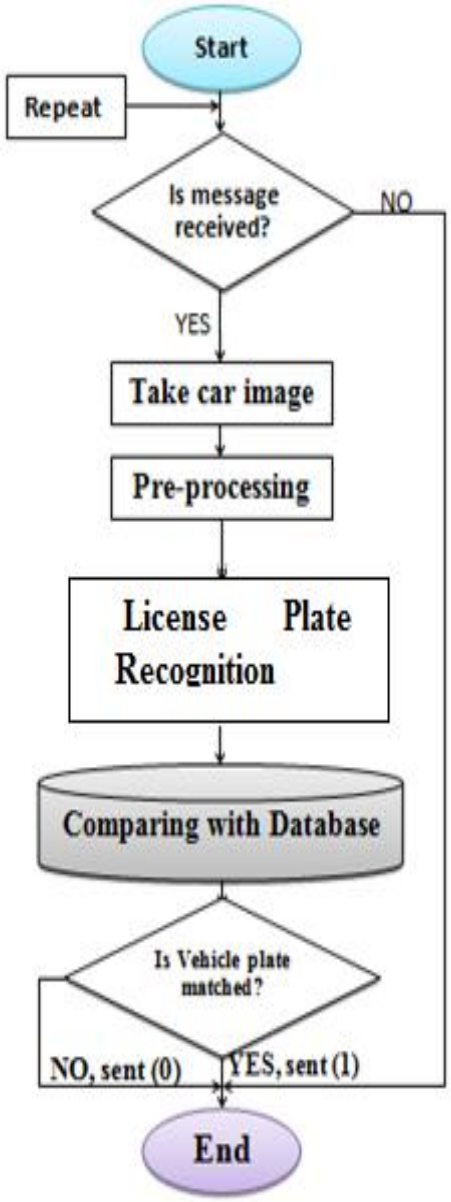

Fig 4.Flowchart of License plate recognition using matalb

Flowchart of License plate recognition steps are:

- Open serial port and scan for data.
- Load image.
- Pre-processing of the image.
- LicensePlate Recognition.
- Compare with database stored.
- Message sent to the microcontroller.

V. SCOPE AND LIMITATIONS

Number plate is differed in term of color, size and type from country to country. Different algorithm has to be applied for different type of number plates. As example for this project's number plate; the method used based on the morphological algorithms and connected components analysis, including six major stages, although the proposed method is designed particularly for the cars have license plates with 6 characters and numbers, it can be readily extended to cope with license plates of many countries, especially those using English characters. This system can be used for whole license plates with different color and it does not matter if the background color is black or white or other colors.

The limitations are; (1) analysis is based on one-row plate number, (2) license plate must have 6 English characters and numbers (3) the entrance barrier gate and the exit barrier gate cannot work at the same time because we have been used only one microcontroller, and each one must wait the other one finished processing as you see on Flowchart for the microcontroller subsystem fig3.

VI. RESULTS

The system was successfully implemented and able to display car license plate as output on Matlab GUI as shown in the fig 5, and it can recognize license plate and compare it with the information in the database. The system can also make decision to open the gate barrier. Generally this project meets 98% of its objective.Number of plate recognition results is shown in Table I.

TABLE I: License Plate Recognition Detection

No of detection	Correct detection	Error detection	Success %
200	196	4	98

Fig 5.Matlab GUI based Automatic gate Control

VII. CONCLUSION

In this paper, application software is designed for automatic Gate controlsystem Basedon license plate recognition,the system issuccessfully implemented. The performance of thedeveloped of algorithms for License PlateLocalization and License Plate Recognition is acceptable range. Also this project will be able to use in all the places,and able to works automatically without need human beings and also the system will be able to recognizes license plates.

VIII. REFERENCES

[1] Othman khalifa,sheroz khan and ahmedSuleiman"Malaysian vehicle license plate recognition" the international Arab journal of information technology,vol.4, no.4. October 2007.

[2] M. M. Rashid, A. Musa, M. AtaurRahman, and N. Farahana, A. Farhana" Automatic Parking Management System and Parking FeeCollection Based on Number Plate Recognition"*in International Journal of Machine Learning and Computing, Vol. 2, No. 2, April 2012.*

[3] DanianZheng, Yannan Zhao, Jiaxin Wang, "An efficient method oflicense plate location, Pattern Recognition Letters," ISSN 0167 8655,10.1016/j.patrec.2005.04.014. Vol. 26/15, pp 2431-2438, Nov. 2005.

[4] PreemonRattanathammawat, Thanarat H. Chalidabhongse, "A CarPlate Detector using Edge Information", in proc. InternationalSymposium on Communications and Information Technologies, ISCIT'06.,pp.1039-1043, October 18-September 20, 2006.

[5] Xifan Shi, Weizhong Zhao, and YonghangShen, "Automatic LicensePlate Recognition System Based on Color ImageProcessing", LectureNotes on Computer Science, Springer-Verlag, Vol. 3483, pp. 307-314,2005.