INTELLIGENT NUMBER PLATE RECOGNITION FOR EFFICIENT TRANSPORTATION

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ABSTRACT

This paper is to design and develop automatic number plate recognition system for inspecting the vehicles .The plate recognition system is developed based on Digital image processing andarm7 based microcontroller. The paper deals with the identifying the emergency vehicles waiting at the traffic signal and also useful for the capturing the vehicles jumps in signals. The automatic vehicle plate recognition system is place a major role in the computer vision techniques towards the intelligent transportation system. In location of vehicle plate, a method of vehicle plate number segmentation and extraction based on improvededge detection and mathematical morphology was presented. In first stage colour images is converted in to grey image and next calculates the each differences between the each pixel and neighbourhood pixels to build up images edge and it can make the license plate standout. By using the microcontroller the vehicle plate will compares with the database present in the eeprom and the information related to the vehicle will be displayed on the lcd, whenever the emergency vehicle is identified then the respective signal will be released.

Keywords: ***Morphological operation,Number plate extraction, IR sensor, Image processingand Micro Controller.***

I. INTRODUCTION

The license plate recognition system place major role in the intelligent transportation system.In previous few years, ANPR or car plate recognition (LPR) has been one among the helpfulapproaches for vehicle police investigation.It's are often applied at range of public places for fulfillinga number of the needs like traffic safety social control, automatic toll text assortment, parking area system and Automatic vehicle parking system. ANPR algorithms are typically divided in four steps: (1) Vehicle image capture (2) range plate detection (3) Character segmentation and (4) Character recognition .i.e. to capture image of auto appearance terribly simple however it's quite exigent task because itis extremely troublesome to capture image of moving vehicle in real time in such a way that none of the element of auto particularly the vehicle range plate ought to be lost. Presently range plate detection and recognition interval is a smaller amount than fifty ms in several systems. The success of fourth step depends on however second and third step square measure able to findvehicle range plate and separate every character.

These systems follow totally different approaches to find vehicle range plate from vehicle and so to extract vehicle range from that image. Most of the ANPR systems square measure supported common approaches like

artificial neural network (ANN), Probabilistic neural network (PNN) andthe Optical Character Recognition and Feature salient, MATLAB, Configurable method, slipperyconcentrating window (SCW), BP neural network, support vector machine(SVM), inductive learning, region based mostly, images segmentation, fuzzy based rule and scale invariant feature rework (SIFT), coloured imaging, Least sq. Method(LSM), on-line registration number plate matching supported weighted edit distance and colour-discrete characteristics. A case study of registration number plate reader (LPR) is well explained. Some authors target rising resolution of the low-resolution image by mistreatment technique known as super resolution.Typically it becomes necessary to assess the standard of ANPR system. After the number plate recognition it will transmitted to the controller then it will compares with the database present in the controller according to the vehicle importance the operation will be performed, If the vehicle is emergency vehicle then the respective signal will be released and if it is signal jump then vehicle number is recorded.

II. LITERATURE REVIEW

To implement the License plate recognition system the study has done on different researches.

To implement this project need to have gone through a background study about various topics like the intelligent transportation system, traffic signaling system in India. In the technology wise, a brief idea about the image processing algorithms for choosing an efficient algorithm to develop according to the required standards. And also required hardware for image acquisition and embedded processes. The image acquisition is the main part in this system, because of it needs a high definition image of number plate to process it accurately. In the previous days the system will be used for the number plate detection, here we are extending by giving an importance to the emergency vehicles in the traffic signals and also vehicles jumps at the traffic signals.

The main objective of the paper is develop and designing the license plate recognition system using an digital image processing and arm7 based lpc2148 microcontroller. And the system will very useful at the heavy traffic congestions and efficient, available at low cost.
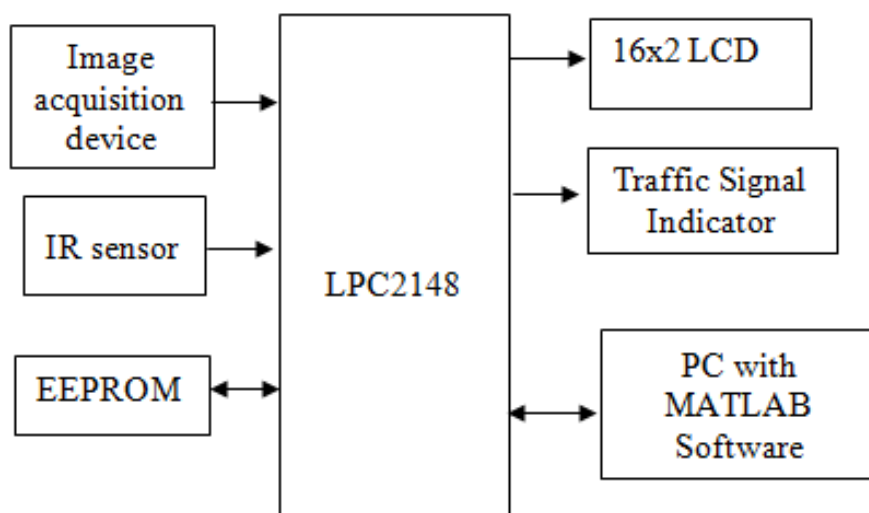
III. HARDWARE DESIGN

Fig 1: Block Diagram

The automatic licence plate recognition system using digital image processing and serial communication technology consists of different hardware and software modules. The following block diagram shows the overview of hardware components included in the system.

3.1 LPC2148 Microcontroller

The LPC2148 microcontroller board based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation, 16-bit/32-bit ARM7TDMI-S microcontroller in available a tiny LQFP64 package, the ram allocated for controller is 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip; 128-bit wide interface/accelerator enables high-speed 60 MHz operation, In-System Programming(ISP) and also Single 10-bit DAC providesanalogue output, Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog, Low power Real-Time Clock (RTC), Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 kbit/s), SPI and SSP with buffering and variable data length capabilities

3.2 Infrared Ray Sensor

An infrared device is an instrument that's accustomed sense sure characteristics of its surroundings by both emitting and work actinic radiation. It's additionally capable of mensuration heat of an object and vehicle work motion. Infrared rays don't seem to be visible to the human eye. These ir sensors are used to the detect the objects, the ir continuously emits the rays whenever obstacle comes to the opposite of it then the rays will be get reflected.

3.3 Image Acquisition Device

In this system a high resolution digital camera is used to capture image. The images are taken in different backgrounds, various weather conditions and movable vehicle image capturing. The image converted RGB to gray scale by using different steps processing in matlab. The preprocessing steps also to be performed for the image contrast and reducing the noise in the image.

3.4 Morphological Operation

In the morphological operation original captured image will be converted in to gray scale image it will improve the operation of removing pixel having a less than disk radius by opening it with the disk shaped structured element. By removing those pixels we can reduce the pixels which are non-related to the number plate because the number plate pixels have the less than the disk radius.
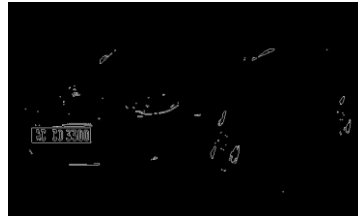

Figure (a)   **Figure (b)**

The figure (a) is original image of the captured by the camera placed at the traffic junction and figure (b) will be the result for the after morphological operation.

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3.5 Threshold Operation and Edge Detection

In the threshold operation gray scale image is converted in to binary image by calculating the threshold level of image. It will find out the minimum and maximum levels in image. By using the edge detection the number plate will contains the characters in it and have abundant edges as compared to the background area of image. It is useful for locating the number plate on the vehicle, after extracting the image according to the pixel density the characters gets identified. The result after edge detection as shown in figure (c).

Figure(c)

3.6 True Number Plate Extraction

After the identification of candidate the number plate area, bounding analysis is used to extract plate area from the original image captured by the camera. From the Bounding analysis, respective row and column indices of plate area are found out. Once the characters of number plate are known then numbers in a plate is extracted from original gray scale image and binary image. After these steps the image enhancement and character segmentation will be performed to avail the exact numbers from the number plate.

IV. SOFTWARE DESIGN

In this proposed system, as we used LPC2148 we need to use following software tools to program for it.

1. KeiluVision
2. Flash Magic
3. Matlab

The KeiluVision is an IDE for Embedded C language. In this IDE, we need to import the utilities and libraries according to the controller we are using. This IDE is very simpler and in user friendly manner to use. It includes all the C/C++ compilers, assemblers, and debuggers in it. It simplifies the process of embedded simulation and testing along with Hex file generation.

The flash magic is a programming utility. The C/C++ program written in IDE will be processed into Hex file i.e. in .hex format. It is necessary to dump the hex file on to the microcontroller.

The Matrix Laboratory is a high level technical computing language and interactive environment for the designing algorithms, here we are using digital image processing utility in the matlab.

V. WORKING DESCRIPTION

The automatic license plate recognition system working start from powered up and it is continuously wait for the vehicle detection at the signal whenever the vehicle is detected then automatically the image will be captured by the camera and the captured image will be transferred to the pc it will contains the matlab with the image processing utility, original image is converted in to gray scale image and morphological and binarization operation is performed and after edge detection and threshold operations will be processed after the numbers in

the plate transmitted to the microcontroller the controller will have the vehicle numbers database the received numbers compares with the database if it matched then operation will be performed according to the importance of the vehicle and also this system will captures the signal jumpers the data will stored in microcontroller unit.

VI. RESULTS
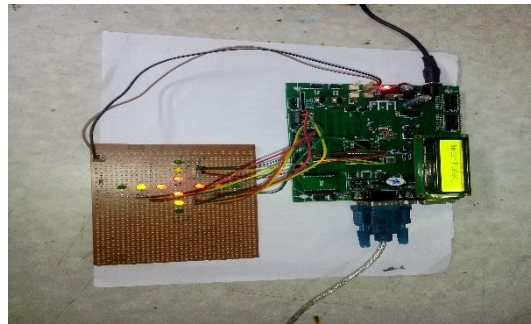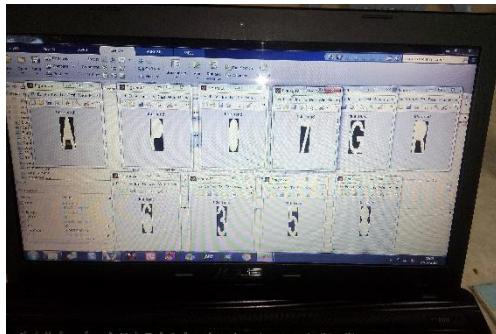
VII. CONCLUSION

The automatic license plate recognition (ALPR) is an advanced algorithm for proving the traffic signal control in case of emergency vehicles came across the traffic signal junction and also capturing the jumpers at the traffic junction. The image processing techniques are very accurate in detecting and extracting the vehicle number details from the number plate image. The system is also a faster solution for penalty payments in case of the vehicle caught by the police man in signal junction.

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