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SMART PARKING AND VEHICLE NAME PLATE DETECTION

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SMART PARKING AND VEHICLE NAME PLATE DETECTION

ABSTRACT

This proposed design solves the problem of unnecessary time consumption in finding parking slot at the user end and vehicle owner information retrieval at the service provider end by introducing a Smart parking system. Smart Parking System, automated with Peripheral Interface Controller PIC is capable of allotting a slot as soon as the vehicle reaches the entrance and intimates the allotted slot to the user through Short Message Service (SMS). In the mean time, the system detects the number plate and identifies the vehicle owner's address owner's identity. An enhancement of Car License Plate Detection method using Vertical Edge Detection Algorithm with reduced computation time and complexity is used for license plate detail retrieval. The system is cost effective as it relays on simple IR transceivers for parking slot detection and images retrieved by CCTV camera or web camera used for capture the whole image. The image captured from the camera detects the license plate of the vehicle.

INTRODUCTION

The improved ALPR (Automatic License -Plate Recognition) algorithm is proposed for the intelligent transportation system. It is mainly used in automation license plate recognition. For this recognizing the license plates these three important modules has to be considered they are license plate location, character segmentation, character recognition. This algorithm works based on the concept of edge detection, image subtraction, mathematic morphology to locate LP (License Plate) region. The LP region will help to remove unwanted noises. Basically, the threshold method is used to degradation and low-quality gray scale images. This method is very effective to reduce complex signal noiseand also it can eliminate smear and smudge in an image. this has a property to deal with low contrast images and non-uniform illumination occur at the variable background intensity. To get the get candidate regions the filters are used to segment the color of the vehicle image through ALPR. There are classified and analyzed to get the license plate from the candidate's region. The candidate region consists of ultrasonic sensor along with the magnetic sensor in the parking lot to determine the accuracy and reliability of the vehicle. For vehicle detection process these magnetometers are used for accurate detection. It contains ultrasonic sensor along with it.

LITERATURE SURVEY

The improved ALPR algorithm is proposed for the intelligent transportation system. It is mainly used in automation license plate recognition. For this recognizing the license plates these three important modules has to be considered they are license plate location, character segmentation, character recognition. This algorithm works based on the concept ofedge detection, image subtraction, mathematic morphology to locate LPregion.The improved version of this algorithm is to get the LP value to peak-to-valley during segmentation work.

In this method describes the modified logical thresholding method for degradation and poorquality gray-scale image into a binary format. This system is mainly to reduce signal noises, non uniform illumination occurs due to background intensity while moving, smudge, shadow, smear and low contrast images. But there is no loss in the output image. first the degraded gray scale background is analyzed for connections and clusters characteristics. It contains the complex and inhomogeneous background. The degraded gray scale document image is converted into binary image with the proposed method known as modified logic threshold method. Depends

upon the local run length histogram and local gray scale inhomogeneity the size of the local area and threshold level will be adjusted. This threshold method automatically varies the manual fine tuning ofc parameters required for the poor-quality gray scale image. this method is widely used in many applications because the more accurate information is kept safety without any over connection and broken stroke.

The candidate region consists of ultrasonic sensor along with the magnetic sensor in the parking lot to determine the accuracy and reliability of the vehicle. The vehicle detection is also applied in min-max algorithm using ultrasonic sensor this is detected with the magnetometers. The experiment is carried out in the multi storied university parking space using different sensing modules in that experiment the pros and cons of all the algorithm is compared and the end result is the ultrasonic sensor along with the magnetometer is the best choice for the vehicle detection. This car counting experiment is carried out throughout the day and our proposed method gives the excellent result using two sensing modalitiesso this method is more efficient.

In an intelligent transportation system, the most important technique used is the Automatic license plate recognition ALPR. It is used for recognizing the license plate efficiency. One of the most difficult tasks is to locate the license plate in the first place. The speed and the recognition rate are affected in ALPR system. Because it is very difficult to locate the license plate from the moving vehicle. This step is one of the most critical steps and it may spoil the whole system. So, to avoid that regional based license plate detection is proposed in this system. First in this system the candidate region is selected based on the filter and color segment of the vehicle. Then it is analyzed and classified based in the license plate in the candidate region. This proposed method is robust and more accurate compared to the other license plate detection methods.

WORKING PRINCIPLE

In the screen there are lots of control buttons were present the simulation process is carried out once the run button is clicked ON. The control buttons are located at the bottom of the screen. During compilation when the source code is modified/reassembled then the system automatically saves the changes and retest the code. This is mainly effective forinexperienced programmers and the time is saved during development process. The main advantage of this system is it will work in real time applications and the simulating the program is very easy if the

aminated setting is correct. For default animation setting systems, it operates at 50ms/frame and the animated options are 20 frames per second so the total real time operation is 20*50ms=1s. The clock speed is modified to check the circuit operation for the other applications. In our circuit the binary count is displayed using output LEDs, the delay between each increment is 75ms. So, the total count will be taken up to 20s. The press button is present at the circuit to start the count and it can be stopped when the button is released again it can be start from the same count once it is pressed. The rest option is also present at the circuit once it is pressed it will start from zero. One of the main disadvantages in this system is the mouse is used for other operations in the circuit so it cannot hold the button continuously. In order to avoid such drawback, the button is replaced as switch and then the circuit is tested in the run mode. During animation function each line is denoted either as red 1 or blue 0 squares at the logic state when the simulation process is carried out.

In this system the advanced sensors network is used to find the free slot and send information through SMS. This system will automatically transmit the real time parking space availability data to the knowledge of users. Based on the VEDA output from the plate details the pixel values are highlighted in the LP.

BLOCKDIAGRAM

SMARTPARKING

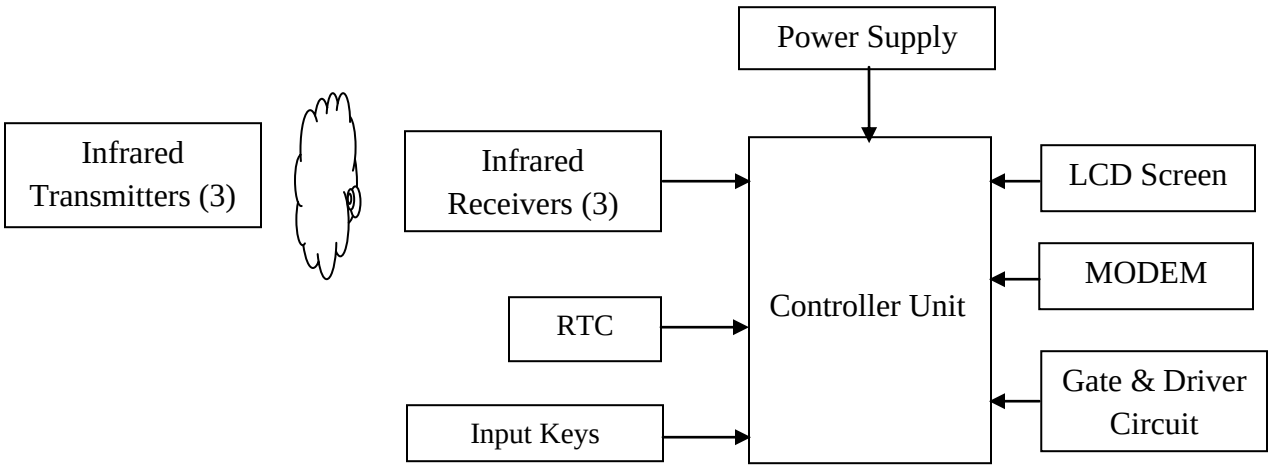

Fig .1 Smart Parking System

In this proposal Smart Parking Reservation System is done easily with the help of Short Message Services (SMS). There are many advanced features in this system such as parking facility can be monitored using mobile, automatic guidance and advance parking reservation can be done. This system is operated with the help of both hardware and software implementation. The overall structure of SPARK is explained. It works with the sensor network. The full-fledged prototype system design functions and features of this parking management is explained in detail.

In the Fig.1 the status of car parking is monitored and displayed in LCD using IR sensors. For reserving the parking slot, the SMS has to send to the parking area. Here UART is used for communication purpose. In UART the request SMS is received to the GSM modem and the request is feed into the microcontroller. The IR sensor will check the availability of parking space and then the request message is processed by the PIC microcontroller unit. Once the space is allocated the confirm reply messagewill be send by the micro-RTU.

The main work of micro-RTU is to send the Input/output signal to the main controller circuit. The main controller unit perform as a timekeeper. The system will allocate the desired time and the SMS is sent to the user. The counter automatically starts counting the time once the reservation is allocated. With in the allocated time the user must enter the parking space or else the reservation got cancelled automatically. The remainder message is sent from the micro-RTU to the user at the end of the time. The communication between the micro-RTU and the main controller is carried out by the OPC OLE process control server units.

The smart parking system is classified into two different parts namely

- Reservation system
- Access system

RESERVATION SYSTEM

The micro-RTU (Real Time Unit) will receive the reservation message from the user in the command format. In the advanced Remote Terminal Units, theSpecialistSystemEngineering (SSE) is mainly utilized for monitoring and controlling the equipment's at the remote distance.the main advantage of micro- RTU is power consumption is very low and is mainly applicable in devices such aslow Input/output I/O counts. In this proposed design, this is mainly used to send reservation request SMS from the user and to get back the confirmation message to the user. It will also be used to activate the I/O device and to send signal to the main controller unit. At this stage, the main controller circuit will act as a time keeper. The counter automatically starts the reservation time once the confirmation message is sent. Once the time is allocated the user mustcome to the parking lot at the allocated time. If the user misses the time, then the reservation automatically gets cancelled. The micro-RTU will send the expiry message to inform the user at the end of the time. If the time is expired, then the userhave to reserve from the beginning steps. The communication between the micro-RTU and the main controlleris checked by process control server OPC OLE. OPC can only be implemented between a client and server applications. In this proposal, the micro-RTU is configured with SSE OPC. It is used to send SMS, connect and program the digital input and output units. The GPS is used to send the SMS wirelessly through GSM antenna for mobile communication application. The GSM has a wide distribution network service which has a high data transfer speed and low cost. So, GSM is preferred instead of 3G network.

ACCESS SYSTEM

In the parking layout structure two barrier gates are present one is for entrance and another one is for exit. It also contains eight parking lots. At the entrance gate the main controller and the micro-RTU are located. After the reservation is confirmed for the parking the used will be given a separate password. The password should be entered at the entrance barrier gate. In this proposed system the microcontroller is used as a main controller for the entire system. The main advantage of using this microcontroller is it consumes low power; the design is fully static and

the performance is high speed. For storage purpose the Complementary Metal Oxide Detection (CMOS) or Electrically Erasable Programmable Read Only Memory (EEPROM) technology is used up to 14 sources. The main work of this microcontroller is to provide information on the availability of the parking space. Also, it must measure the time period for validity of the password. Depends upon the availabilityof the parking area it should allow or deny the access. For programming the micro controller, the WARP-13 programmer board is used. To type the password the matrix keyboard is place along with alphanumeric LCD display and for the barrier gate 12V relay is included.

LICENSE PLATE DETECTION

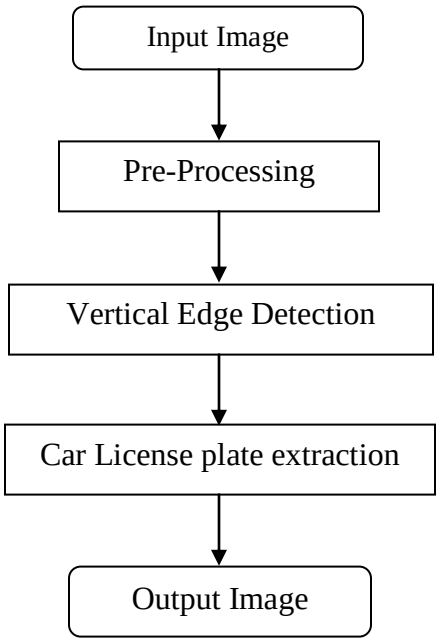

Fig .2 License plate detection

For detecting the vertical edges in the image, the VEDA method is proposed. This process is explained with the help of Fig.2, the Adaptive thresholding AT is used to convert the colored input image into the grayscale image. it will convert the image into binarized image. in order to enhance and remove noised from the binarized image the ULEA is applied. The extraction process of vertical edges is carried out by VEDA. The LP is detected by using VEDA process that will detect only the highlighted pixel values. By this process many unwanted lies are removes.

UNWANTED LINES ELIMINATION ALGORITHM

In general thresholding process many thin lines may be present that doesn't belong to the LP region. Even many long foreground lines and short lines contains random noise edges present in the LP region. These are the unwanted lines that is produced from background noise edge. These lines may interfere in the LP location. The unwanted lines elimination algorithm is used to eliminate these background noise edges from the images. There are some steps to be considered to enhance the process as a morphological operation. These unwanted lines are formed because of four cases. These four cases are explained in detail with the angles. In the first case, the line is horizontal with an angle equal to 0◦ as −. In the second case, the line is vertical with an angle equal to 90◦ as |. In the third case, the line is inclined with an angle equal to 45◦. In the fourth case, the line is inclined with an angle equal to 135◦. So, in order to eliminate these cases lines the ULEA is proposed. The ULEA process is explained with the help ofabinary image.the pixels are denoted as black and white. The black pixel values are the background, and the white pixel values are the foreground. Throughout the all image a 3 × 3 mask is used. In this testing process the black pixel values in the threshold is tested. In LP, in order to retain the small values, the lines equal to 1 pixel are checked. For example, the threshold image value is b(x). If the mask center is black for the current pixel then the surrounded eight pixels values are being tested. Suppose if the two corresponding pixels are white located around the current pixel then the current pixel will be converted into white and it will act as a foreground pixel. Likewise, all the pixels are tested using ULEA method. After performing this method all the unwanted lines were removed from the image.

VERTICAL EDGE DETECTION ALGORITHM

In Fig.3, the main advantage of Vertical Edge Detection Algorithm (VEDA) is the characteristics of the plate details can be distinguished from the starting and the last letter of the plate. So, it can able to detect and it can be able to recognize the character very fast. The Fig.3 shows the black and white image of the plate after the threshold and ULEA process. The VEDA will process the intersection between the black-white and white-black regions. In this proposed method the 2× 4 mask is used for the process.

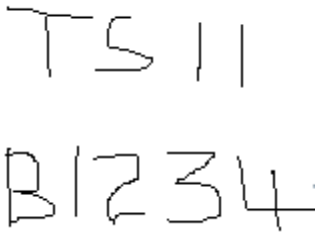

Fig.3 Number Plate Detection

The canter pixel of the mask is located at points (0, 1) and (1, 1). The black region is detected by moving the mask from left to right.

CANDIDATE REGION EXTRACTION

This candidate region extraction process is divided into four different steps. That is explained as follows.

Count the Drawn Lines per Each Row

In every row the number of lines were drawn will be counted and stored in a matrix variable format i.e. detonated as a=0,1,…… and height =1.

Dividing the Image into Multigroup

The processing time for the next step is delayed due to huge number of rows. So that the time consumption will be increased in order to avoid that some rows are grouped together to form a new group. Like that many groups where formed based on the number of rows. The total number of groups represents the all groups, the total number of images in rows represented as the height, the candidate region extraction CRE constant is represented as C.C is chosen to represent one group set of rows.In this method we taken C as 10 for each ten rows so that the computation time will be saved. This can be avoided later depending on computation time to process the image. It will be varied depends on consumption or loosing of desired details. So here in this method for each group ten rows are allocated. The horizontal lines where drawn in some rows due to many lines. Its is represented to store the horizontal lines for each group. For storing the drawn line for each ten groups the matrix method is created. This step might have the LP details for distinguish regions.

Count and Store Satisfied Group Indexes and Boundaries

In some groups lines the plate details cannot be present. In order to eliminate the unsatisfied groups, the threshold is used to keep only satisfied group in the LP region which has the details. Only those groups have 15 line can be the part of LP region. Each group will be checked. In the LP region the all the total groups are counted and stored and thus it is part of the LP region. After the threshold step the remaining groups having the details are stored in the LP region location.By using the own index values the upper and lower boundaries are extracted from each satisfied group. For plate searching process only small sized LP are included that is determined with the help of 15-linethreshold value. If the less value is selected from the predefined threshold then the result obtained will give wrong result this happen because of noise and non-plate regions. It will be considered as the true LP region. The best detection rate for the optimal threshold obtained is $\geq 1/20 \times$image_height.

CONCLUSION

The proposed system is very effective and fast which is based on vertical edge detection. This proposed design is five to nine times faster than the existing method. The performance of this system varies depending upon the image resolution. The proposed method the data sets are taken from the car license plate using web camera. Web camera use to take images from different conditions and from various scenes. The major advantage of this system has the better computation time and high detection rate. By using SMS system, the available parking space can be booked in advance so that the searching of parking lot can be avoided. This smart system is built with microcontroller and micro-RTU unit. This design is fully automatic and easily accessible for reservation purpose. Due to this advantage it can be used everywhere and its very effective design.

I/We Claim

1. This proposed design is a smart parking and vehicle name plate detection system. This proposed system solves the problem of unnecessary time consumption in finding parking slot at the user end and vehicle owner information retrieval at the service provider end.

2. As claimed in Claim 1, Smart Parking System, automated with Peripheral Interface Controller PIC is capable of allotting a slot as soon as the vehicle reaches the entrance and intimates the allotted slot to the user through Short Message Service (SMS).

3. As claimed in claim 2, the system detects the number plate and identifies the vehicle owner's address owner's identity.

4. As claimed in Claim 1, An enhancement of Car License Plate Detection method with reduced computation time and complexity is used for license plate detail retrieval.

5. As claimed in Claim 3, By using SMS system, the available parking space can be booked in advance so that the searching of parking lot can be avoided. The parking facility can be monitored using mobile, automatic guidance and advance parking reservation can be done. This system is operated with the help of both hardware and software implementation.