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AUTOMATIC GATE SYSTEM USING IMAGE PROCESSING FOR RESERVED PARKING ZONE

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ABSTRACT

The Automatic gate control system will increase convenience and security at entrance of all the important places that require protection and Security. Automatic license plate recognition plays an essential role in many applications and many techniques have been used. These applications range from complex security systems to common areas and from parking admission to urban traffic control. License plate recognition has hard properties due to varied effects as shadows, irregular illumination conditions, variable distances, cars' velocity, scene's angle on frame. The proposed system is an Automatic gate system using image processing which is particularly for reserved parking zone that permits the vehicle to enter the building in case of the vehicle's image matches any image in the database.

INTRODUCTION

Nowadays, as you all know there is a big scientific development in the informatics and programming techniques, in which the images took a very important role in various zone such as medicine media, education, design, industry, security etc (IJACSA, 2014). The main reason for this development is the wide using of computer in all these zones. The digital image permits to get images instantly without needing for chemical treatments. The image processing is used in many computer vision applications (Ismael Saad Eltoum and Zhaojun Xue, 2014). Almost everything in the modern world is going automatic. We have built this project to increase the convenience and security at the entrance gate. 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 (Zyad Shaaban, ?). The purpose of this paper is to develop an automatic gate 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. It notice that the most researches nowadays, especially image processing researches, tend to use in security field, because the digital images become the main dependent component in most electronic devices used in this field. Where it can store a group of images in a computer database and then using images processing programs to recognize the captured pictures from monitoring camera can make the right decision depending on matching the recognized image with the stored database. Due to increasing need for protecting the materials and the articles in the houses, directorates, etc. This paper uses a digital images and microcontroller (atmega32) to control opening and closing a gate.

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Related Work

There are various ways to design Automatic Gate System e.g. License plate recognition using image processing ,RFID tag and recognition of fingerprint or facial features using sensors. In order to design Automatic Gate System we have referred five research papers in which three are based on license plate detection, one based on RFID tag and one on parking space detection system. Zyad Shaaban designed a license plate recognition system based on a character recognition algorithms (Zyad Shaaban, ?). In (2014) International Journal of Advanced Computer Science and Application proposed a system based on RFID tags. In this research they have used RFID tag to detect the vehicle at the gate (IJACSA, 2014). In (2014) Ismael Saad Eltoum, Zhaojun Xue introduced a Automatic gate system using vehicle license plate recognition technique using image processing (Ismael Saad Eltoum and

Zhaojun Xue, 2014). In (2014) Garima R. Yadav and H.K. Waghmare proposed a Indian license plate recognition system using image processing (Garima R. Yadav and Waghmare, 2014). In (2012) R. Yusnita, Fariza Norbaya, and Norazwinawati Basharuddin designed a Parking space detection system using image processing. (Yusnita, Fariza Norbaya, and Norazwinawati Basharuddin, 2011)

Proposed System

This paper used the license plate number of each vehicle to permit it to enter the building through the gate. The proposed algorithm for recognition (based on recognizing the patch of the vehicle) consists of two main stages: the first stage isolates the license plate First we do Plate Extraction; run-lengths are suggested for writer identification and documents segmentation. Run lengths are determined on the black and white image taking into consideration either the black pixels corresponding to the foreground or the white pixels corresponding to the background. The next step is Normalization; there are several methods to compute the skew angle for the vehicle license plate: horizontal skew, vertical skew and combination of both horizontal and vertical skew. PCA is used to analyze data in several application fields such as pattern recognition and image processing. This method is a statistical technique that is used to find the Eigen vectors. These vectors represent the relation of these data sets along that line. In this paper, the image of the car plate is normalized based on PCA technique to determine the skew angle. The 3rd step is Segmentation; the plate image determined using the above steps is converted into binary image. Here the characters from the license plate are extracted. Next we have the Database Check; in this step we do the following extracted characters are put together in the form of a string in to Java String variable .The String is then passed through a database query. The database will have set registered users with their respective License plate numbers for their vehicles .The query will be reply with either a true or false depending whether the string (License number) is present in the database

The Hardware Components used are

Simulated Model

A small model used to simulate the real building. The model 2*3 m2 area represents 20*30 m2 real building i.e. the scale is 1:10 the height of the model is 20 cm, the slide gate is 5 cm high and 15 width. Small electronic motor uses (5V) to move the gate by arm joining the motor with gate.

Arduino board

The Arduino board is a small microcontroller board. The Arduino board can write programs and create interface circuits to read switches and other sensors.

IR sensors

These are used to detect the arrival of the car.

Servo motor

Two servo motors are used. One, Used to open the gate. Second, used to rotate the camera

Conclusion

The system detects the arrival of a car by using a sensor circuits. The image acquired by the snapshot is scanned for presence of a car, which is then confirmed .The system can recognize car license plate and compare it with the information in the database. If number plate is registered, after noting the time of arrival it allows the car in by opening the gate and simultaneously displays the available parking space on the display outside the gate. If number plate is not registered it does not open the gate. The system can also make decisions to opening and closing of gate. It also checks for the available parking space in parking lot. The system updates its parking space after the car has been parked in the parking area. The system is automated and does not require human intervention, accept for maintenance of the hardware.

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