Image processing based intelligent parking system

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Image Processing Based Intelligent Parking System

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Abstract— **India is one the Country with High dense population. Due this high population Transportation and Parking of the Vehicles is the major issue faced by the Peoples. This Paper is to Provide a Intelligent Parking System through Image Processing. In this Systematic Approach the Image Processing Technique can be used to Identify the free empty Parking area to Park our Vehicles. In the Proposed process the Parking area can be marked with certain specific number and an sensor and with the help of these sensor the empty space can be identified to park the vehicle. The Image processing Display consists of the seven segments of display in real time. In addition to the Display an Audio system have been interfaced in order to provide Oral information of the parking system. The Seven segment display can be used to identify the empty parking area with specific numbers. The specific numbers can be displayed inorder to park the vehicle at vacant position without any struggle. The proposed process can be implemented in software platform with the help of Image processing technique and Hardware implementation can be done by interfacing with the Arduino Uno.**

Keywords— **Intelligent Parking, Image Processing, Vehicle, Arduino uno**

I. INTRODUCTION

In Olden days people use the public mode of transportation as Bus and Train for moving from one place to another. But due to Globalization the people move from rural area to urban areas for employment and other needs the Individual transportation have been improved a lot for their ease. Owing to these increase in vehicle the parking become very complicated and the people can park their on the either sides of the roads results in heavy traffic. At present there is no systematic approach in parking system. the manual control can be implemented in some areas but it is no so sound to satisfy the present number of vehicles. the number of vehicle was more than the number of parking areas[1- 4]. The administration have implemented many techniques to ensure the effortlessness of traffic at car parking zones.

At Present most the people not aware of the empty space at the parking areas. In proposed idea the camera can be used to sense the empty space through video image detection. The image can be captured and they can be allowed to Image segmentation and edge detection through boundaries with canny operator method. The moving car is to be parked at specific zone, at first the parking area has to be identified at the zone then the parking space has to be identified and check whether there is empty space is available or not. In The parking area the Image Processing Technique have been Implemented that will undergone the Image Segmentation and Edge Detection in addition to that a Counter is also Interfaced

to count the Number of Entries/ Exit and have an note on that. In the Paper [5, 7] work attempts on the variation between the moving image and the Stationary Image on the Basis of Variance in Brightness of the Image. The Existing process[6,12] attempts on taking Time Differential Image. The Problem Occurs is when the object is moving at high speed it is a tedious job to take snap on that image. The Present work attempts on Identifying the Parking lots by the respective number and the Sensor present at that lot. The Sensors are placed at the parking area if the signal from transmitter will not received by the sensor then the sensor is sensed and result shows that the Parking lot is filled, so the driver will prefer the rest of the parking lots.

II. SYSTEM MODULE

The Proposed module attempts on the Image Processing Technique through the MATLAB as a Software platform[8]. The projected mechanism involves five step module to perform the operation. The processing steps can be shown in the block diagram as shown in Fig. 1. as follows.
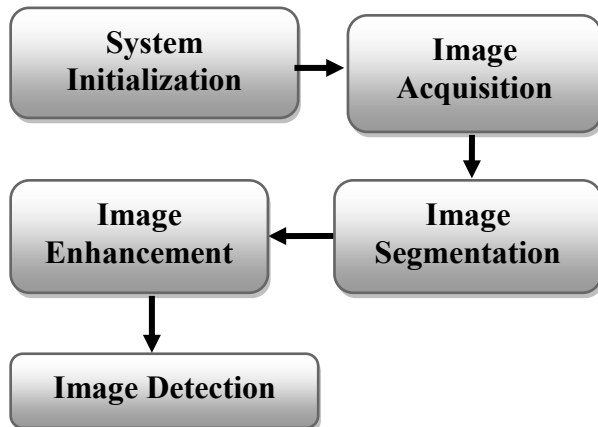

Fig. 1 Block Diagram of System Module

A. System Initialization

In the System Initialization Process the manual drawing procedure will be put into practice. In the manual Drawing process the image can be drawn with Park slot number which will be helpful in identifying the Empty parking area. The main objective of this process is to Identify the Empty Parking area without any manual interruption[9, 10]. The Diagram drawn should be visible, clear, easy to understand, complete information about the parking slot and it should be sufficient during the process of Initialization. The Sensor and the

Camera should be stationary during the initialization plan of the system architecture. Thus the detected image from the camera can be undergone for the further image processing techniques as shown in Fig. 2.
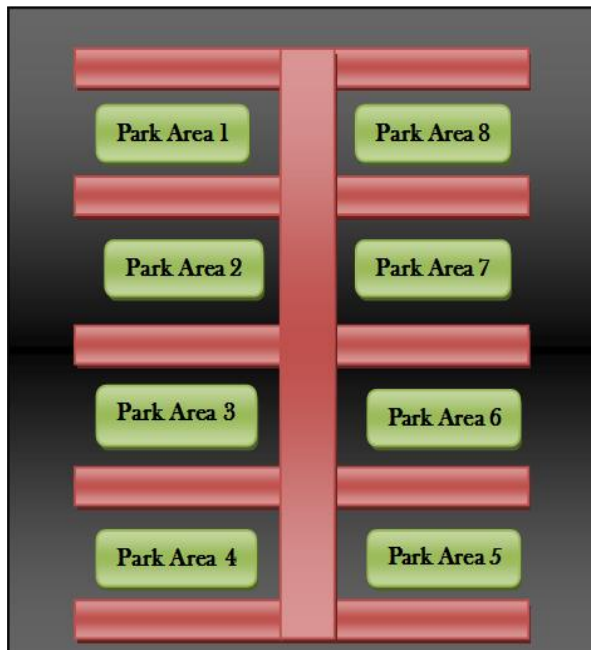

Fig. 2   System Initialization

B. Image Acquisition

Once the System Initialization module gets completed it can be allowed to the next processing module called as the image acquisition module in the Image Processing Techniques. In the Image Acquisition module the Images can been captured from the parking area through the Camera. The acquired images for the processing can be captured with High definition cameras present at the parking area[11-13]. The Images can be captured by the Camera by top view and side view of the Parking slot inorder to sense the Incoming input image consider the image as shown in Figure. 3.

Fig. 3   Image Captured from Camera

C. Image Segmentation

Image Segmentation can be a Next type of module present at the Image Processing Steps. The Image Segmentation can be a Major part of the Image Processing technique which can be used to identify and analyze the image at a glance [4]. The process involved in the Image segmentation can be show in the block diagram as shown in figure. 4,
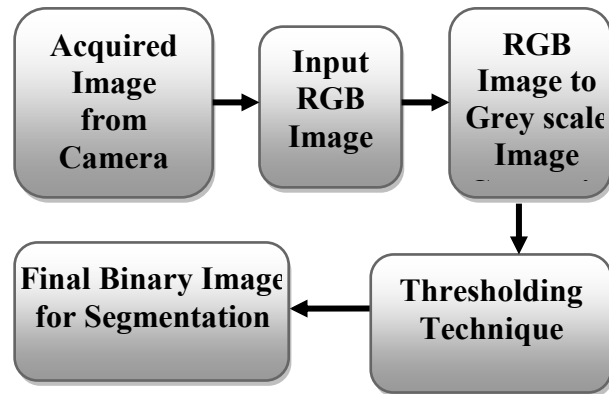

Fig. 4 Flow chart of Image Segmentation Process

The Image Segmentation process will provides the each and every part of the Image. The visual characteristics are obtained by the considering the number of pixels present in that captured image. Thus the Obtained image after segmentation process will be a better quality output result. The obtained set of Pixel can collectively provide the entire image. Thus the Empty parking area in a parking slot can be recognized by the outline, Edge, Boundary, Object, etc.,.[8] The process involved Image Segmentation is Clustering will partition the Image into number of clusters. The Clustering process can be preferred on the source of assortment of Manually or through Random Selection process as Shown in Figure. 5.

Fig. 5 Binary Image for Segmentation

D. Image Enhancement

The Image Enhancement module the binary Image obtained from the Image segmentation module is been considered. In this Process the Image has be Enhanced to remove the

unwanted noise obtained during the Binary Image Conversion. They can be used to Trace the outline of the Detected Image. The Digital camera will take the Images from various locations with some noise.[9] The Obtained noise can be removed with the help of a technique called Morphology. The Morphology can be a special Technique which is used to neglect the Imperfection obtained during the Image Segmentation[1,7]. The Morphological mechanism undergone the following process named as Dilation, Erosion, Opening and Closing Process and among those four process the Opening and Closing Morphological process are the most commonly used Process for the noise removal. The Opening process is to remove the tiny objects present in the Segmented Image and the Closing process is to remove the unwanted and tiny holes present at the Segmentation process. The main role of the Morphological mechanism is to provide the exact Edge and shape of the image without any Distortion[6]. In the proposed mechanism the exact boundary of the image has to be used to detect the empty parking space is to be traced. The rest of the process named Dilation and Erosion is used in this stage inorder to increase or decrease the pixel range of the Output Image after enhancement. The Dilation is used to improve the Pixel range to the outline boundary of an image. The erosion is an another process which will removes the unwanted pixels on the boundaries[3,18]. In the proposed process if the input pixel value of an binary image is equal to '0' then the output pixel is to be '0'. Thus the obtained image of Figure. 6 will shows the Enhanced for processing [14,17].

Figure 6. Image after Noise Reduction

E. Image Detection Module

The Image Detection Module is Implemented only if the Exact Edge and outline Boundaries of an Image is obtained by the Image Enhancement Module. In this process the parameters of Area and Perimeter has to be considered inorder to obtain the exact shape of an Image[5]. The exact shape of an Image is necessary to provide information to the drivers to park their vehicles in the empty parking area. The Shape of an Image can be obtained using the below given expression[9,18,21].

Shape = (4×pi×area) / (perimeter^2)

Figure 7. Detected Parking Slot

III. RESULTS AND DISCUSSION

The parking of a vehicle through the image processing can be highly efficient and more accurate without any manual interruption. In the proposed architecture will shows a parking area with 8 slots of parking area. Based on the threshold value the Empty parking area can be displayed through an Camera preview display unit. The display can be indicated through the LED display. In addition to the LED display an Audio system have been Interfaced to the System design. Thus the Vehicle is sensed by the Sensor the availability of Parking area and appropriate Parking slot can be informed to the driver through audio announcement. Thus the proposed architecture will be very helpful in park the vehicle in the parking area without any distortion and which results in the time and parking area consumption can be reduced.

IV. CONCLUSION

If the proposed architecture is Implemented in the day to day life the parking of vehicle can be made easier. The Process of identifying the parking area and the number of empty parking slots can be determined with the help of an Image processing technique. The parking slots can be easily identified and the shape of that particular slot can be determined which results in occurrence of parking the vehicle in safe area within short span of time without any delay. The Proposed design is implemented for a small area of 8 Parking slots in a particular region. But the proposed idea can be extended for all around the city by providing additional information through the GPS module which would be helpful to identify the parking area in a particular zone through GSM with an Mobile application and the status of that parking area that is the availability of the empty parking slot has also to be considered in future through the Mobile Application.

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