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Automatic Signboard Detection System by the Vehicles

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Abstract:
A major cause of accidents is not considering the signboards on roads, and not following the rules accordingly. So to avoid this problem, introducing a signboard detection system in the vehicle which will detect the signboard and warn the driver about it. It displays the alert message or information on provided LCD and voice alert through speakers. Traffic sign recognition is important to transport system on the highway or road. Major approach is to detect road sign and extract it using openCV. The system will play an important role in saving many life.

Keywords: Signboard detection, Raspberry Pi, Open CV, Image processing, color based detection, zone pixel density.

I. INTRODUCTION

According to the survey over 1,37, 000 people were killed in road accidents in 2013, that is more than the number of people killed in all our wars put together. Most of the traffic accidents are the result of carelessness, ignorance of the rules and neglecting traffic signboards, both at the individual level by the drivers and the society at large. The magnitude of road accidents in India is alarming. This is evident from the fact that every hour there are about 56 accidents taking place. Similarly, every hour more than 14 deaths occur due to road accidents. When someone neglects to obey traffic signs, they are putting themselves at risk as well as life of other drivers, their passengers and pedestrians. All the signs and signals help keep order in traffic and they also are designed to reduce the number and severity of traffic accidents. Some drivers believe that some traffic signs are simply not necessary. Hence there is a great need to minimize the accident rate to save valuable lives. This system designed with the help of Raspberry pi. The Digital image processing plays important role in the sign capturing and detection system. In this paper we have introduced a system that can help the driver, significantly increasing passenger's safety. Road sign detection and recognition system also implemented lately by many companies. In earlier days the road signs were detected manually by the drivers. But now the Autonomous Driving Assistance. System (ADAS) can easily recognize the signs using raspberry pi camera module. This system worked focused on a low cost, off the shelf solution, a mini embedded computer Raspberry Pi. That is capable of doing everything that one would expect a desktop computer to do, from word processing, image processing to playing games. The system has originally been developed by Raspberry Pi Foundation in an effort to give young people an easy solution to learn coding and computer programmingpi3 board. In this paper we provide alertness to the driver about the presence of traffic signboard on the way. The system provides the driver with real time information from road signs, which consist the most important and challenging tasks. It provides an acoustic warning to the driver in advance of any danger. This warning then allows the driver to take appropriate corrective decisions in order to mitigate or completely avoid the event.

II. LITERATURE REVIEW

Human beings like enjoying their life, and that's why they invented and created the vehicles. While enjoying their environment, they suffer with accidents and lose lives and properties. To avoid rash driving of the drivers and their accidents, the system has designed with the help of two main controllers Raspberry pi and PIC microcontroller. The Digital image processing plays an important role in a road sign recognition system. Raspberry pi processor provides an interface between sensors and database and image processing results. Apart from this an another unit i.e. the PIC controller unit controls the small signaling parts, which may cause to a major issue in future for example puncher of tires, headlight failures etc. To avoid this the indication of tire pressure is displayed on the screen and the headlight dimming is controlled by the use of LDR sensor. As well as, in addition to this system have added the control of motors through ultrasonic sensors which are very helpful to avoid accidents and it maintains a gentlemen distance to the fronted vehicles. Hence through this, the performance of the vehicle is controlled automatically according to the situation.

There are many drawbacks of the existing systems
As per the papers "Traffic Sign Board Detection and Voice Alert System Along with Speed Control'' by Anju Manjooran, Anphy Varghese, Annmariya Seby and Krishnadas J [1], "Detection and Recognition of Alert Traffic Signs" by Chia-Hsiung Chen, Marcus Chen, and Tianshi Gao [2], the existing methods deals with the automatic detection and recognition of traffic sign boards. But it still is a challenging problem with a number of important application areas, including advanced driver assistance systems, keeping track of rules followed and autonomous control of vehicle's speed**.** Also as per the paper "Android Based Signboard Detection using Image and Voice Alert System" Sanchita Bilgaiyan, Sherin James, Sneha. S Bhonsle, Shruti Shahdeo, Keshavamurthy [4], "Traffic Sign Board Detection" by Annmariya Seby [5], the existing system is android based and

needs third party software to work. This cause extra cost to system and is not very practical. Some of the system uses gps to get information about upcoming hurdle, again it becomes a hard part to implement in practical.

III. PROPOSED SYSTEM

Major focus is on introducing a system that resolves most of the drawbacks of the existing system. The basic idea of proposed system is to provide alertness to the driver about the presence of traffic signboard at a particular distance apart. This system provides the driver with real time information from road signs. It generates a warning to the driver in advance of any danger. The warning allows the driver to take appropriate actions in order to avoid the accident. The main advantage of this system is, this usages an embedded system machine which is more portable and less costly. Image processing technology is mostly used for the identification of the sign boards. The alertness to the driver is given as an audio output as well as on provided screen.

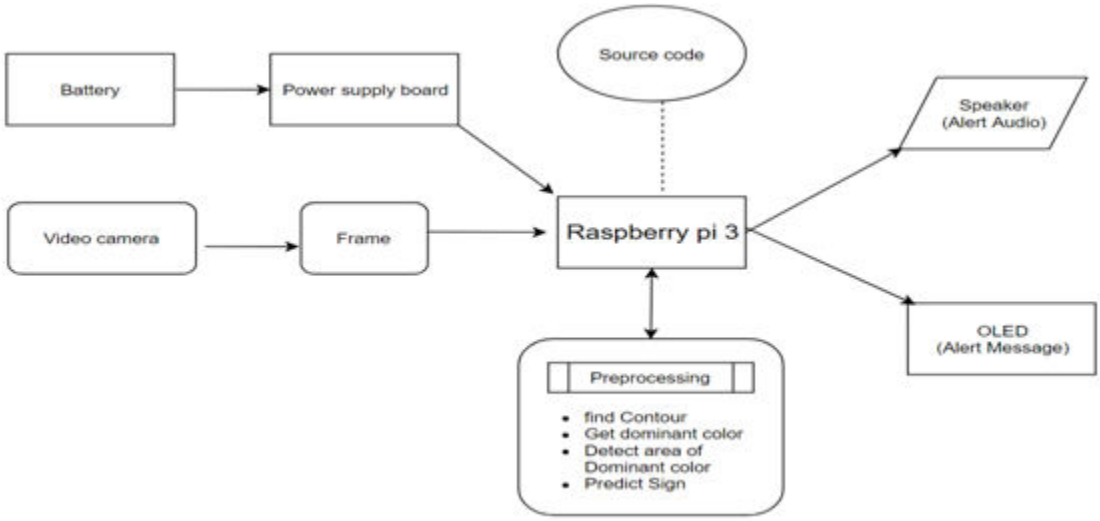

Figure.1. Block diagram of the system architecture

Figure 1 shows the architecture of proposed system. The system will always try to determine between the lower and upper range of the red and blue color and a rectangle be formed on the red and blue sign board. The rectangle formed on the sign has a fixed area by the use of that area system creates a signal that control the output of the raspberry pi. After match found it generates a signal so the raspberry pi sends a control signal to the electromechanical relay to control the motors of the chassis. The most trending technology the Self-driving car, which has a number of parameters to measure, among that Road sign recognition is also one of the needed parameters to make the car autonomous. Here Raspberry Pi system is used with the camera interface. The system will look onto the road, whenever it detects the sign like no U-turn, stop etc. It will recognize the sign and confirmed that Road sign as the box. The sign detection will be announced by APR voice Playback board.

Methodology of the proposed system:

The methodology of the system is as follows:

Step 1: Capturing the Frame from live stream video provided by OpenCV:

OpenCV (Open Source Computer Vision Library:) is an open-source BSD-licensed library that includes several hundreds of computer vision algorithms. Open CV has a modular structure, which means that the package includes several shared or static libraries. To capture a video, we need to create a Video **Capture** object. Its argument can be either the device index or the name of a video file. Device index is just the number to specify which camera. Normally one camera will be connected (as in my case). So I simply pass 0 (or -1). We can select the second camera by passing 1 and so on. After that, you can capture frame-by-frame.

Step 2: Preprocessing the captured frame:

- Convert to gray color image.
- Blur image to reduce noise

For color conversion, we use the function that determines the type of conversion. For BGR → Gray conversion the function converts an input image from one color space to another. In case of a transformation to-from RGB color space, the order of the channels should be specified explicitly (RGB or BGR). The default color format in Open CV is often referred to as RGB but it is actually BGR (the bytes are reversed). So the first byte in a standard (24-bit) color image will be an 8-bit Blue component, the second byte will be Green, and the third byte will be Red. The fourth, fifth, and sixth bytes would then be the second pixel (Blue, then Green, then Red), and so on.

Median Blurring

This is highly effective against salt-and-pepper noise in the images. Interesting thing is that, in the above filters, central element is a newly calculated value which may be a pixel value in the image or a new value. But in median blurring, central element is always replaced by some pixel value in the image. It reduces the noise effectively. Its kernel size should be a positive odd integer.

Step 3: FIND SIGNS

- Find circular objects

  The function finds edges in the input image and marks them in the output map edges using the Canny algorithm. The smallest value between threshold1 and threshold2 is used

for edge linking. The largest value is used to find initial segments of strong edges.

- Compare the dimensions
- Divide into zones
  Here we are dividing the whole circular contour into three zones, given figure 2 shows the zones that we have divided
- Get intensity of blue and white pixels in zone

Figure 2: Zone division

Step 4: CLASSIFICATION OF SIGN AND OUTPUT

- Compare pixel intensity in zones:

Here we compare pixel intensity in zones divided above, and then classify based on them.

- Classify signs or Identify as sign:

The classification is based on the following algorithm:

ifzone_1_color density < specified and if sum of zone_0_color < sum of zone_2_color then it is "TAKE RIGHT"

else it is "TAKE LEFT"

else if sum of zone_1_color > sum zone_0_color and sum of zone_1_color >sum ofzone_2_color then it is "GO STRAIGHT"

else if sum of zone_0_color < sum of zone_2_color then it is "GO FORWARD AND RIGHT"

else it is "GO FORWARD AND LEFT"

else it is invalid sign.

The data flow diagram of the System is shown below in the figure 3

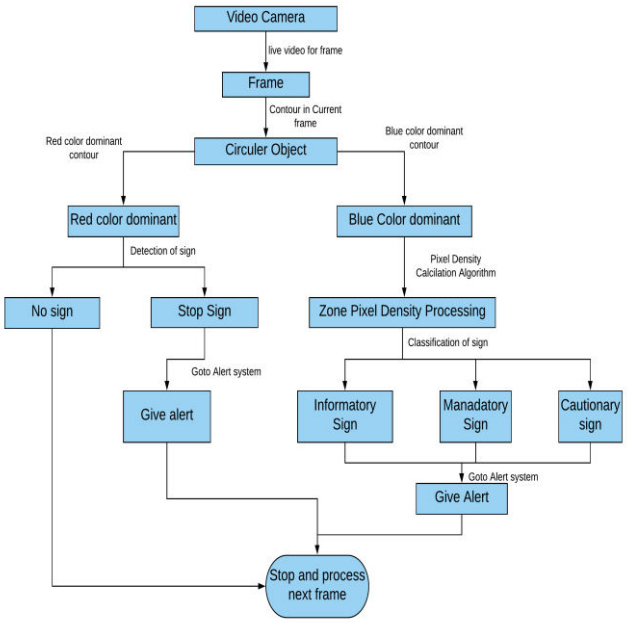

Figure.3. Data Flow Diagram

IV.CONCLUSION:

The driver helping system has been presented in this paper. The basic idea is to recognize and classify the traffic signs from an input image. Finally, the recognition and classification of these potential road signs is done according to a database of road sign patterns and controls. The performance of this idea depends on the quality of the input image, in relation to its size, contrast and the way the signs appear in the image. Our system is fully based on automation process which replaces the existing manual operation. Automation process, in turn decreases the human error, increases the accuracy, processing speed and reliability. Here we present a method to make a self-responding system. For future enhancement, more advanced resolution camera and advanced processors can be used in order to detect the sign perfectly and quickly. A System should be developed to monitor the rear end vehicle during the turnings so that the automation process will ensure more safety.

V. REFERENCES

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