Vehicle Speed Control System Using Image Processing

CHAVAN AVINASH GANPAT (avinashchavan333@gmail.com)

WAKCHAURE GANESH SUBHASH (wakchaureganesh1996@gmail.com)

NALE KIRAN KALIDAS (kirannale00@gmail.com)

PROF. A.P. JOGLEKAR

Sinhgad Academy of Engineering,Kondhwa,Pune-411048

ABSTRACT

The automatic sign detection and recognition has been converted to a real challenge for high performance of computer vision and machine learning techniques.

Traffic sign analysis can be divided in three main problems: automatic location, detection

and categorization of traffic signs. Basically, most of the approaches in locating and detecting of traffic signs are based on color information extraction. A natural question arises: which is the most proper color space to assure robust color analysis without influence of the exterior environment. Given the strong dependence on weather conditions, shadows and time of the day, some auto's focus on the shape based sign detection (e.g. Hough transform, ad-hoc models based on Canny edges or convex hulls). Recognition of traffic signs has been addressed by a large amount of classification techniques: from simple template matching (e.g. cross-correlation similarity),to sophisticated Machine learning techniques (e.g. support vector machines, boosting, random forest, etc), are among strong candidates to assure straightforward outcome necessary for a real end-user system. System is develop that would allow to detect traffic signs along the way depend on which change the speed of vehicle (car). In this project traffic sign board is detected and speed limit is recognized using image processing in MATLAB and send recognized data to the embedded system serially. Embedded system includes LPC2148 controller to control the speed of vehicle.

I. INTRODUCTION

Highways are meant for high speed commutations, however there are certain limitations which should be followed in order to ensure safe commutation.

But many drivers do not follow these speed limits which results in fatal accidents. E.g.Pune- Mumbai Expressway experiences more than two major accidents every day.

These accidents results in blockage of road which contributes to traffic jams.

So we have to deploy sophisticated speed guns and cops to detect violators.

This system addresses all these issues at on go, being major motivation behind the project.

Problem Statement :

To implement a reliable system which locates, detects, characterises and categorises speed limit sign boards in real time and changes the speed of vehicle accordingly.

Objectives of proposed work :

1. To implement the Image Processing based Vehicle Speed Control System.
2. Implement proper hardware to accompany the system.
3. Setting the proper Algorithms to operate system in real time.

II. LITERATURE SURVEY

In Rubini.R, et al [1] proposed a system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives alerts like "road works", "steep slopes", "school zone" in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller. When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and

time. The LCD displays the lane speed limit and shows the number of times, speed was violated.

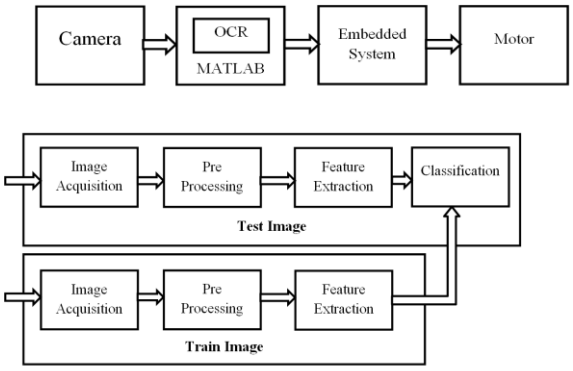
In S.P. Bunker, et al [2] described a real-time online safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location. In G.Sathya, et al [3] achieved with the help of "AARS using GPRS 3G TECHNOLOGY". Through this, we can

provide a smooth flow for the ambulance by controlling the traffic light according to the ambulance location to reach the hospital. The location of the ambulance can be easily identified with the help of the GPS unit installed in it. A controller in the traffic junction can automatically control the traffic flow and thus reduces the time delay taken by ambulance to the hospitals. The traffic junction band the ambulance will have GPRS 3G modem to communicate between them. The chances of misusing the ambulance can overcome with the help of an RFID tag given to the doctor"s in the respective hospitals so that the security can be attained.. This scheme is helpful for the Traffic police to control the traffic thereby helping the patients who are facing emergency.

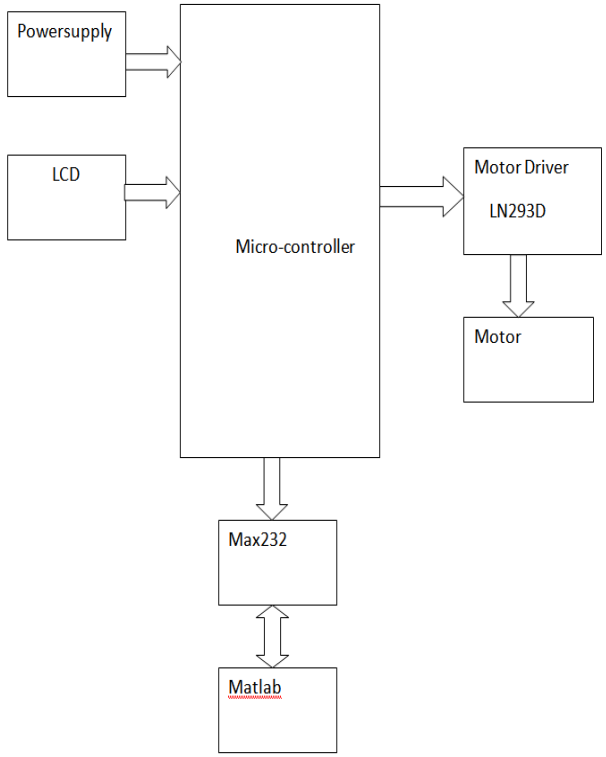
In S.P. Bhumkar et al [4] described a real-time online safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location.

In Jyotika Kapur et al [5] dealing with India there has been an increase of 17.4% in the total number of road accidents during the period of 2011-2012.This percentage has raised eyebrows and caught the attention of many to curb the growing rate. It is found that 80% of the times it is the fault of the driver. This can be avoided if we could device a mechanism which could alert the driver about the coming jeopardy. This can be achieved by monitoring the distance between two cars using Bluetooth. If the distance decreases than the one specified, the driver would be signaled and according to the signal, necessary actions will be taken by the mini gadget present in the car. This paper proposes that with the help of Bluetooth technology, we can keep track of the speed of the car and take appropriate actions to avoid accidents.

Architectural Block Diagram



Hardware Block Diagram



1. LPC2148 controller: It is the main heart of the system used to control the whole system.
2. RS232: To connect base server with microcontroller.
3. 16x2 LCD: Used to provide the display facility.
4. DC Motor driver: To drive and control the speed of the DC motor.
5. DC Motors: Used for vehicle control function.
6. Webcam: Used to capture the speed limit image from the speed limit sign board.

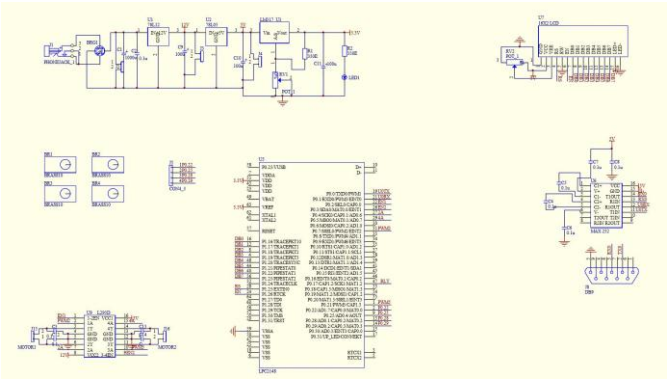


Fig Circuit Diagram

III. WORKING

In this project we are using LPC2148 as main controller. It belongs to ARM7 architecture. The goal of developing the system is to control the speed of vehicles. Using the system we can control speed of a vehicle. Assume here vehicle is motor. Here we are using PWM. PWM is used for controlling the speed.

This project uses regulated 5V 500mA power supply. A 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify

the ac output of secondary of 230/12V step down transformer.

In MATLAB OCR module image is captured by camera, in pre-processing part localization of traffic sign board is performed. After that recognized the speed limit form the captured image is done, that recognized number is send serially to the controller.

Recent advances in object recognition open up great opportunities for robust traffic sign detection in uncontrolled environments. Still, challenges remain, such as the detection of traffic signs in cluttered scenes, in varying conditions of brightness and illumination, affine distortions according to the point of view, partial occlusions or even other signs and other information attached to traffic signs. Another additional difficulty is the simplicity of the shape of the traffic sign, which means that it can be easily confused with other objects or parts of objects. Depending on its distance from the acquisition system, the traffic sign G size can vary and its spatial resolution may be very low (e.g. 30–40 pixels). Given the regular geometric information provided by the traffic signs, one of the first attempts to address the problem was to apply Hough transform on the edge map of the region of interest. To speed up the process Piccioli used colour information to limit the region of interest followed by a geometrical analysis on the edge map to extract and detect circular and triangular shapes. After extracting straight lines using Canny edges the different segments of proper length and slope may be suitable for use as traffic signs. In [16] the authors propose a method that first segments the images based on their colour and then applies a local and global growing technique to hierarchically organize the information and form the traffic sign candidates. Their convex hulls are compared to a predetermined set of basic traffic sign shapes to check that the region of interest represents a traffic sign. Moreover, the authors claim that the real-time performance they achieve makes the method very attractive for final integration in operating systems.

IV. ALGORITHM

The algorithm is divided into two parts as Encryption algorithm and Decryption algorithm.

1) Start.
2) Turn ON the Computer.
3) Take picture from camera and detect the speed limit board.
4) Detect the speed limit (character) and compare with the database.
5) If characters (numbers) are matched with the database then we have got the speed limit.
6) Send the detected speed limit to Embedded System through UART.
7) Rotate the DC motor as per the input from microcontroller.
8) Stop.

V. APPLICATIONS

- Automatic Speed Limit Detection Using Camera Module
- Commercial Vehicle Operations
- Automatic Speed Control
- Advanced Transportation System for Safety

VI. CONCLUSION

In VSCS using Image Processing successful implementation of objectives such as encryption of image and decryption of image and function of speed control is achieved.

Vehicle Speed Control System Using Image Processing will reduce the number of accidents and ensure driver safety. Using Keyless authentication will provide vehicle safety. Using the LPC 2138 and the motor driver IC the functioning of speed control is easily operated.

Such a kind of system for vehicle safety and prevention for accidents is present only in the luxurious costly vehicles. Using Vehicle Speed Control Using Digital Processing this system can be implemented in normal vehicles also.

VII. FUTURE SCOPE

Parallel implementation would allow real-time operation whilst processing every frame during turn detection which may further improve the overall global sign detection ratio. Additional work investigating the temporal clustering of approaching sign recognitions would also help improve performance. Whilst the system has been developed to meet UK road regulations developing a specific junction detector could extend its application to other countries in which this instance cancels current speed restriction.

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