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SPEED REGULATION USING RASPBERRY PI FOR ROAD SIGN RECOGNITION SYSTEM

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Abstract - *Image processing is widely used in various fields such as organ imaging, imaging technology, development of instrumentation, computer aided study of geological areas, planet exploration etc,. The main objective of the paper is to demonstrate the use of image segmentation in traffic sign recognition using small computing environments such as Raspberry Pi and ARM processors. Traffic Sign Recognition (TSR) systems employ vehicle mounted cameras that captures traffic signs and alerts the driver about what actions are need to be taken. Primary function of these systems is to inform the driver of recent traffic signs that may have been missed due to distraction or inattentiveness. A camera scans the roadside for signs. Real-time image processing software identifies, interprets and display them. It is mainly implemented using Raspberry Pi, as it provides an On-chip interface between sensors, image processed data bases, while also performing actions with peripherals attached*.

***Key Words*:**: Digital Image Processing, Raspberry Pi, Embedded System, Road Sign Recognition

1. INTRODUCTION

Driving is the process which includes visual information processing The driver needs a lot of traffic monitoring in order to accomplish accident free driving. Road signs carry much information necessary for the traffic monitoring, they occur in standardized positions in traffic scenes, shapes, colours and pictograms. They describe situations, define right-of-way, prohibit or permit certain directions, warn about risky factors etc, limits speeds in hazardous conditions, etc.

As the artificial intelligence is emerging, vehicles can be made to take decisions without human interference in some hazardous conditions and so provide advanced driver assistance such as collision prediction and avoidance. It is desirable to design smart car control system in such a way which will allow evolution of fully autonomous vehicles in the future. The TSR system is also being considered as the valuable complement of the navigation system. It can be made more accurate by providing the current position of a vehicle and vehicles surrounding it. Road sign recognition is getting an immense interest by companies such as Google, BMW, Porsche, Apple etc.

Road sign recognition is based on three major steps as described.

1) Color segmentation -- separate red and blue segments from the image.

2) Shape recognition and sign description– recognize possible traffic sign patterns and then do the color representation for proper description of sign.

3) Neural network– classify the detected patterns to known traffic signs using standard database.

It uses mono vision camera and colour based segmentation. RGB colour scheme of data provided by the camera is used for colour segmentation. This system can able to recognize almost all type of sign including speed signs, direction signs, restrictions signs, cautionary signs etc with red and blue in colour.

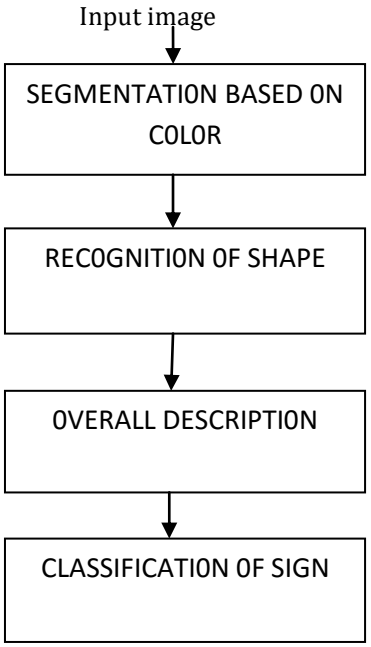

CHART-1: Tsr Algorithm Flowchart

2. OVERVIEW OF SPEED REGULATION ON RASPBERRY PI

2.1 Existing System:

- No camera based signal detection
- No indicator
- With controller application

2.2 Proposed System:

In our proposed systems recognize speed limit signs, stop signs and warning signs such as pedestrian crossing, railroad crossing etcalong with Raspberry pi.

Hardware units used:

1. Raspberry Pi
2. Camera
3. SD card
4. Display unit
5. Vehicle unit
6. Zigbee transceiver

Software used:

1. Raspbian
2. Matlab
3. Language – Linux , Embedded

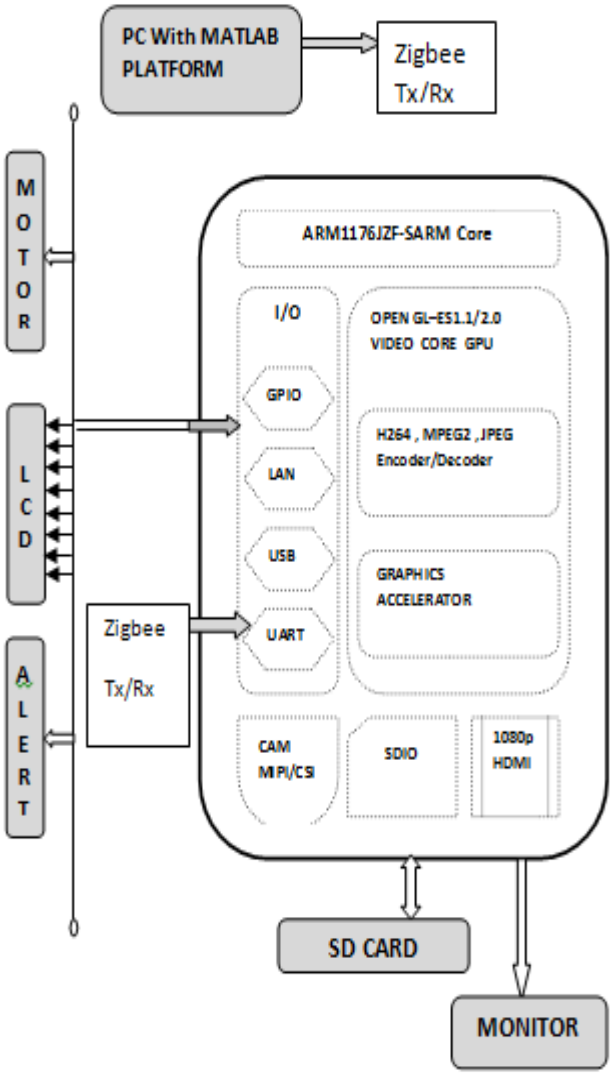

Fig-1: System Model

PC with MATLAB platform: MATLAB code is written based on TSR Algorithm for regulating the speed according to the traffic signs seleced.

Zigbeetx: Traffic sign selected is transmitted to the TX/RX PINS of raspberry pi through Zigbee rx.

Zigbee rx: Serially transmitted data from Zigbee tx is received by Zigbee rx and fed to the Raspberry Pi.

Raspberry Pi: It is a series of credit card sized single board computer

Model Used In Project: Raspberry pi model B+,

Components of Raspberry Pi used in System:

1. GPIO PINS:5V supply, GND, TX, RX and output pins for speed regulation with the help of relay circuit.

2. HDMI Port: To serve as an interface between Raspberry Pi and monitor display.

3. 3.5mm Audio cum Video Jack: To hear the alert message.

After setting up the raspberry pi the python code written is executed to provide pulse width modulated signal based upon the selected traffic signal. By switching the Relay circuit ON and OFF with PWM signal, the speed of the car's motor is regulated.

3.EXPERIMENTAL SETUP & RESULTS

3.1 Setup

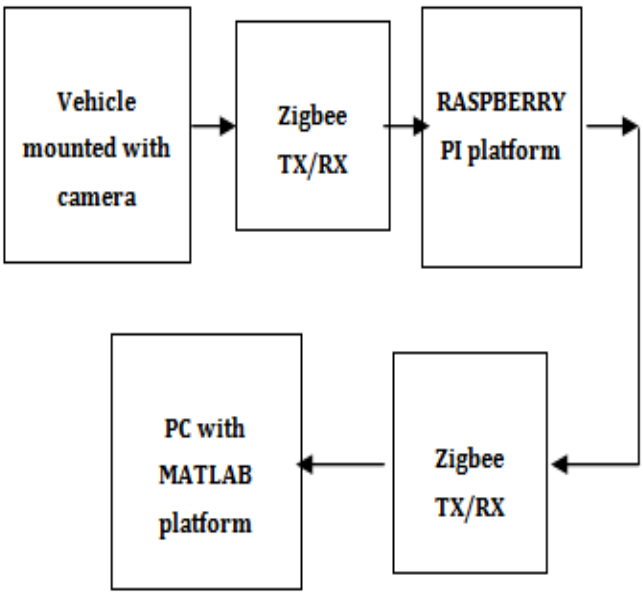

Fig 2: Overall Setup Of The System

3.2 Scenerio

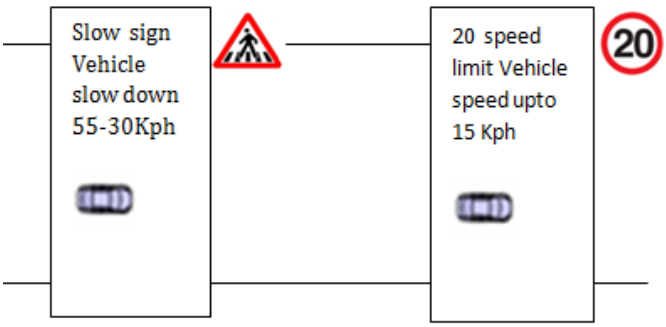

Fig 3: Over All Scenerio Of The System

3.3 Results

CONDITIONS OF ENVIRONMENT	SPEED OF CAR	AVG RECOGNITION DISTANCE(meter)
Morning	50	25
Afternoon	50	25
Evening	50	25
Snowy	50	23
Rainy	50	24
Night with high beam car and no othrt light source	70	Does not work

Advantages:

- Image signal detection
- Indicating through display

Disadvantages:

- Does not work in low intensity environment hard real time

4 CONCLUSIONS

This paper proposed TSR algorithm which is successfully able to recognize almost all type of signs at different day timing and weather conditions and it also works well as speed controller to IAV vehicle. Improving system performance in night time and with high speed and also large number of traffic signs used for training the neural network, are few works which need further advancement of the system.

The disadvantages can be overcome by using special low intensity cameras and by using hardware oriented processors to meet the hard real time conditions. The project can be modified to display the message about the coming road sign on car's display, so that the driver will be aware of what actions to take in case of low visibility environments.

Additional sensors can be used to improve the artificial intelligence, performance and to take rapid decisions.

REFERENCES

[1]. Alberto Broggi, PietroCerri, Paolo Medici, Pier Paolo Porta, Guido Ghisio .Real Time Road Signs Recognition In the IEEE Intelligent Vehicle Symosium Istanbul, Turkey, June 13-15, 2007.

[2]. Jun MiuraTsuyoshiKandaYoshiakiShirai. An Active Vision System for Real-Time Traffic Sign RecognitionProceeding, 2000 IEEE Int. Conf. on Intelligence Transportation Systems, page 52~ 57, MI, Oct. 2000.

[3]. D.G. Shaposhnikov,LubovN.,et.al. Road Sign Recognition by Single Positioning of Space-Variant Sensor WindowProceeding, 15th International Conference on Vision Interface, page 213~ 217, Calgary, Canada, 2002.

[4].Michael Shneier. Road Sign Detection and RecognitionProceedings of SPIE -- Volume 6230, Unmanned Systems Technology VIII, May. 9, 2006.

[5]. VavilinAndrey,Kang Hyun Jo. Automatic Detection and Recognition of Traffic Signs using Geometric Structure AnalysisProceedings of SIEC-CASE International Joint Conference 2006—Oct, 18-21 2006 in Bexco, Busan, Korea.

[6]. SantoshiAzami,ShunjiKatahara,Masayoshi Aoki. Route Guidance Sign Identification Using 2-D Structural DescriptionProceedings of the 1996 IEEE Intelligent Vehicles Symposium, 1996—Sep, 19-20 1996 in Tokyo, Japan. Pp. 153-158.

[7]. SantoshiAzami,Masayoshi Aoki. Route Guidance Sign RecognitionProceedings of the 1996 IEEE Intelligent Vehicles Symposium, 1995—Sep, 25-26 1995 in Detroit, USA. Pp. 338-345.