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Road Side Speed Sign Monitoring and Controlling System on Raspberry Pi

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ABSTRACT

The images can be processed in order to get desired results for many other applications by Digital image processing. We determine the road side speed sign detecting, monitoring and controlling by using the raspberry pi, which is single board computer. We are designing system to avoid road accidents with updated technology. Many systems are designed with implemented with wireless technology like zigbee, RF communication, Bluetooth, GPS and GSM. But we cannot reduce accidents on roads due to lot of population in now a days. So we are approaching new SOC which is most accurate in executing application. Here we are using raspberry pi, web camera, LCD, motor driver and motor. When there is any road signs are observed beside the road, the vehicle gets engine off so to make driver to observe the sign. By this system we can save life of travelers. In this project the car's speed can be controlled automatically by using motor driver when speed signs displayed on the LCD screen using raspberry pi.

Keywords: Raspberry pi, USB camera, motor driver, motor, LCD display, road side speed sign controlling.

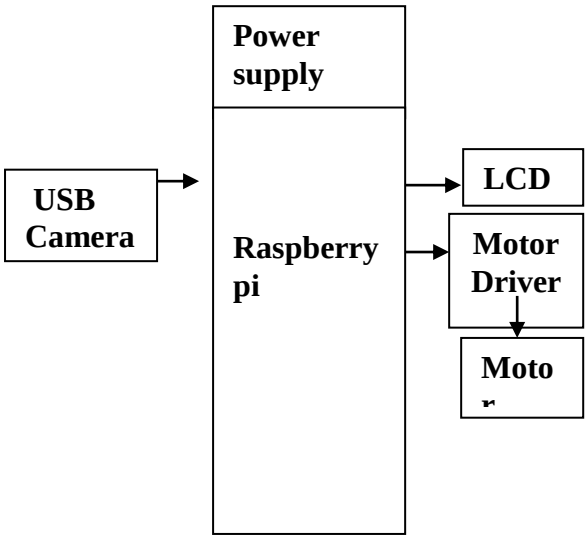
I. INTRODUCTION

In the existing design traffic signs were manually recognized. If the driver didn't recognize those signs can lead to accident. To prevent those accidents, an automatic recognition module needs to be designed. Road side signs are recognized, detected and displayed those results on the LCD screen. The displayed results are added with the time and location by using GPS module. Arduino-Uno is used to retrieve GPS data and write them into text file.

II. PROPOSED SYSTEM

In the proposed system we are implementing Raspberry pi technology which recognize and control the road side speed signs continuously and improve the Conditions of highly automated driving systems. In this project raspberry pi will Recognize the signs, pi camera will capture the images. The recognized speed signs will be displayed on the LCD. The speed of the car will be controlled, if the car travel in high speed. For detecting speed signs shape-based algorithms were used because it is much reliable than color based segmentation. The car's speed can be controlled automatically by connecting GPIO pins of pi board to the motor driver board.

Block Diagram:



Hardware Description:

Power Supply:

Transformers:

Transformers are contraptions which meander down a generally higher AC Voltage into a lower AC yield voltage.

Figure 1

On the transformer, one side will have three terminals and the other will have two. The one with the three terminals is the meandered down yield of the transformer, and the one with the two terminals is the place the information voltage is to be accustomed.

Rectifier:

Rectifier is a contraption which is used to change over AC voltage to DC voltage. It is generally isolated into Full wave and half wave rectifiers.

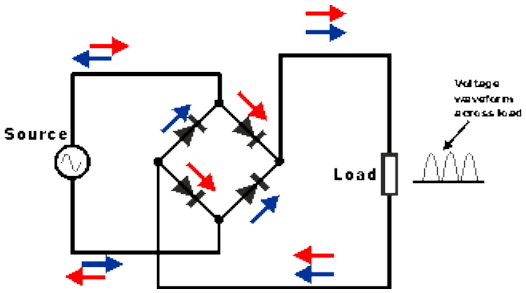


Figure 2

Capacitors:

Capacitors are used to get the impeccable and smoothest DC voltage in which the rectifier is used to get throbbing DC voltage which is used as a piece of the light of the present predetermination, from the connector.

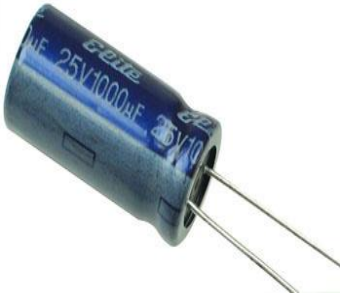


Figure 3

Voltage regulators:

The 78XX voltage controller is mainly general used controller for voltage controllers. The XX addresses the voltage of which the voltage controller conveys as the respect the particular device. 7805 will convey and control the yield voltage of 5v and 7812 will make the yield voltage of 12v.

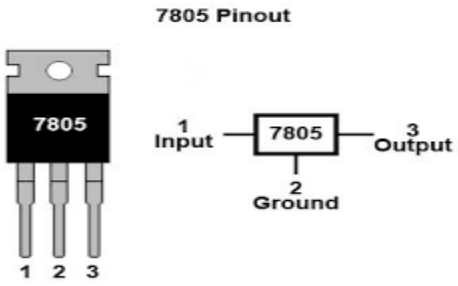


Figure 4

Raspberry Pi 3:

Raspberry Pi is one of the well known SOC (system on chip) Which has HDMI port, Composite RCA, two USB ports and 3.5 mm jack. For data storage purpose,

we using microSD card and For network access we can use either LAN or Wi-Fi. Raspberry pi is single-board computer with wireless LAN and Bluetooth connectivity. The raspberry pi 3 model B is the new model of the third-generation of raspberry pi.

Figure 5

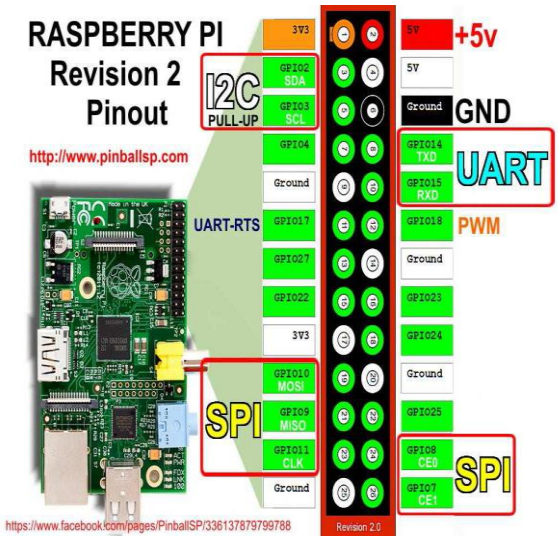


Figure 6

LCD:

Here we are using LCD(liquid crystal display) with size 16*2 which means 16 columns and 2 rows. We can use LCD in two modes: 1. 4-bit mode and 2. 8- bit mode.In this LCD each character is shown in 5x7 pixel framework. This LCD has two registers, specifically, Command and Data.

LCD (Liquid Crystal Display) screen is an electronic show module and locate an extensive variety of utilizations.

Pin Diagram:

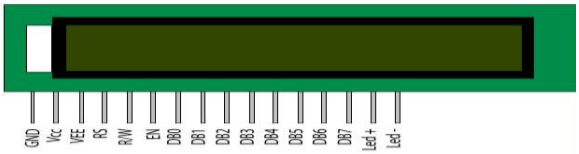


Figure 7

USB CAMERA:

Camera plays a vital role in automation purpose. The camera is used for monitoring of a room from a remote place. The camera used is a USB camera. Whenever the user clicks on to video button on loaded webpage, the corresponding room video will be streamed on to webpage .For this purpose we use a MJPG streamer.

The below figure shows the camera that has been used for monitoring of a room.Here we are using camera to capture signs beside the roads. The model is Logitech c-270 which camera images.

Figure 8

Features of camera:

- ✓ Hear more clearly**:** This microphone produces quality audio.
- ✓ See more detail: It contains a VGA video sensor for a clear image. It also adjusts for low-light condition.
- ✓ Resolution: motion vide0 (0.31 mega pixel i.e. 640*480 pixel)
- ✓ Supported interface: USB
- ✓ Imaging features: fixed focus and automatic image adjustment with manual override.
- ✓ Field of view: 59 degree diagonal field of view.
- ✓ Sensor present in it is CMOS VGA technology.
- ✓ The camera also comes with integrated microphone

Motor driver:

IC L293D is a motor driver which used to vary the speed and direction by changing various inputs.

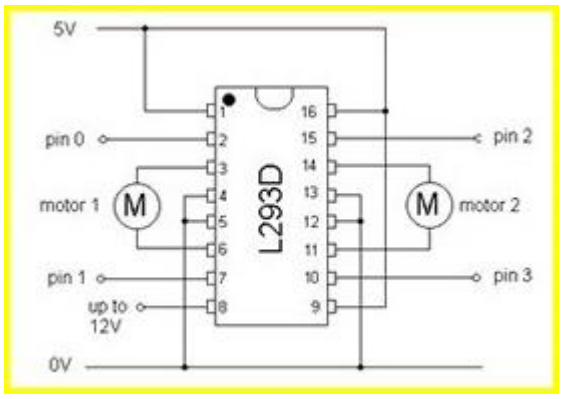


Figure 9

MOTOR :

The motor is operated with DC voltages and available with different RPMs. In some of this electronics projects you may want to control a DC Motor accompanied by 8051 microcontroller. This maximum current that can be sourced or sunk from a 8051 microcontroller is 15 mA at 5v.

Figure 10. DC motor

Software Description:

RASPBIAN OS:

Raspbian is a free OS used for Raspberry pi. To create environment similar to Linux.

Raspbian is this recommended operating system for normal use on a Raspberry Pi.

Raspbian comes with more versions like raspbian stretch and raspbian Jessie. Raspbian OS consists of set of programs that make the raspberry pi to run. It provides more utilities than a normal os does.

WORKING OF THE PROJECT:

This project mainly uses the raspberry pi ,which is small single board computer. The raspberry pi board is power up by using power supply terminal on the board by connecting charger cable from pc or laptop to the pi board. The USB camera capture the images in real-time and transfers the images into raspberry pi board where the images are acquired and preprocessed using python programming language, tesseract OCR engine is used where received images converted into text file. The output of the raspberry pi is displayed on the LCD screen.

Motor driver board is connected to the GPIO pins of raspberry pi board. The motor is driven by motor driver which amplifies the current given to its input terminal. The motor can be controlled or slowed for some delay by recognizing the speed signs.

RESULTS:

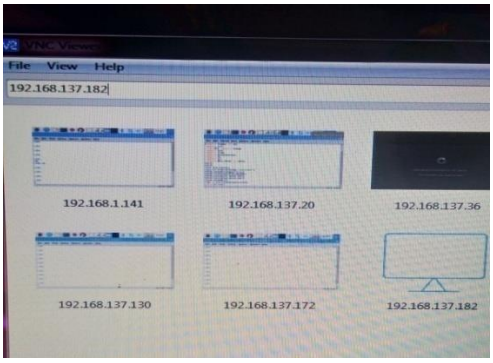


Figure 11. raspberry pi IP address from advanced IP scanner into vnc viewer.

Figure 12. Displaying "welcome" text on the LCD display.

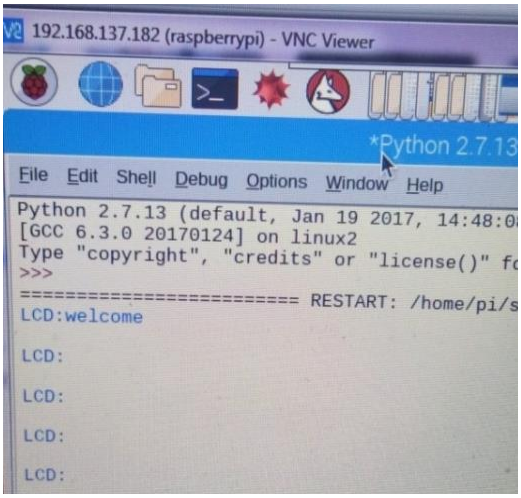


Figure 13. Displaying "welcome" text on python shell IDLE.

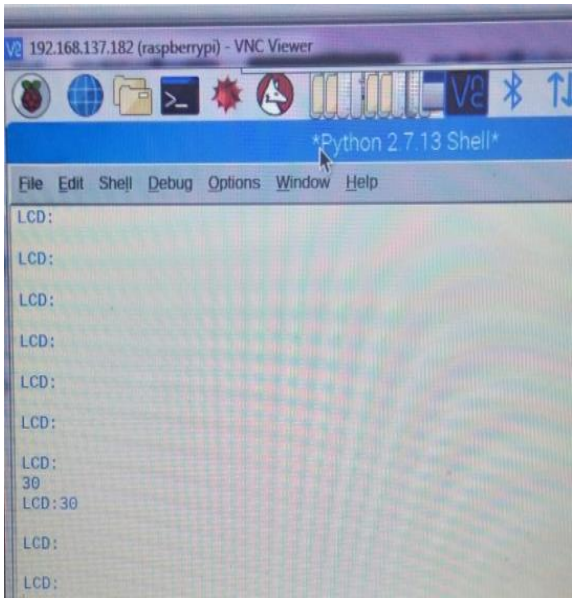


Figure 14. Displaying "speed sign 30" on the python shell IDLE.

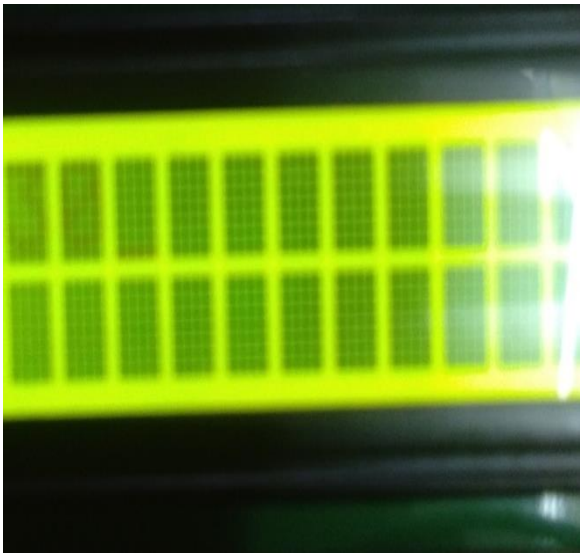


Figure 15. Displaying speed sign text"30" on the LCD screen

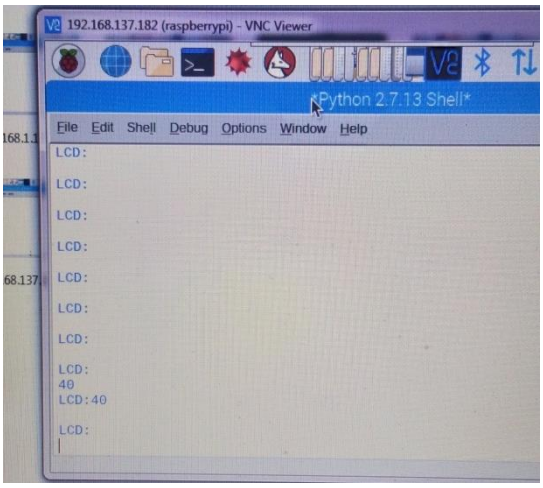


Figure 16. Displaying "speed sign 40" on the python shell IDLE.

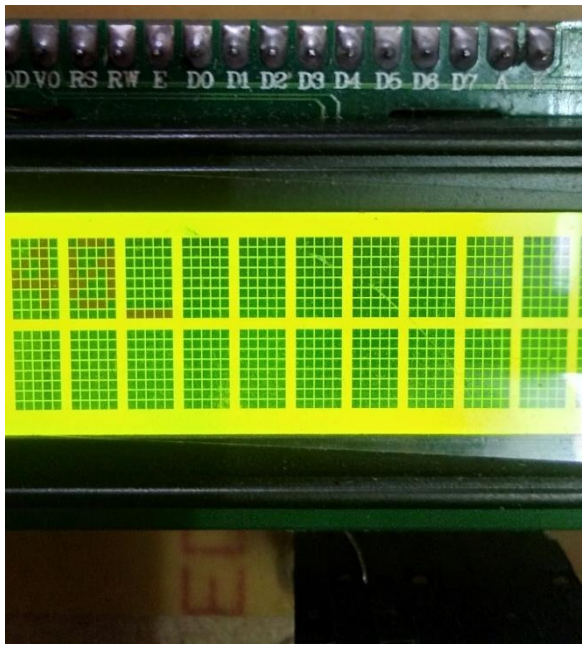


Figure 17. Displaying speed sign text"40" on the LCD screen.

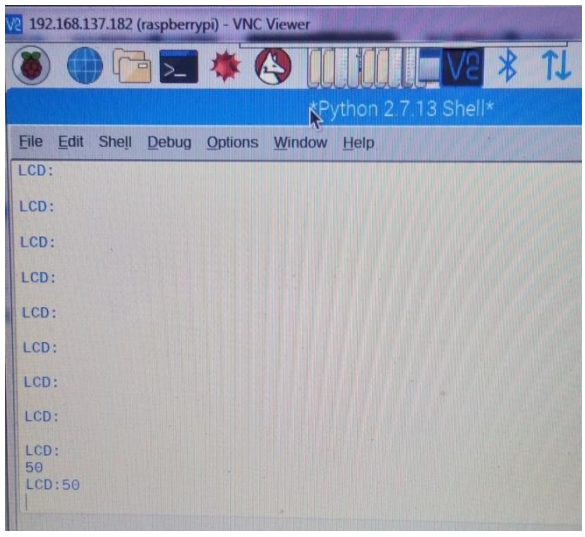


Figure 18. Displaying "speed sign 50" on the python shell IDLE.

Figure 19. Displaying speed sign text"50" on the LCD screen.

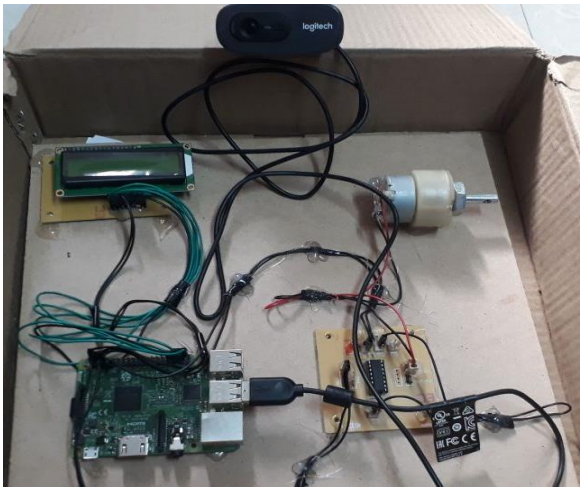


Figure 20. Road side speed sign monitoring and controlling project kit.

Applications:

- This system is used in artificial intelligent applications such as autonomous driving, advanced driver-assistance systems(ADAS), mobile mapping and mobile eye etc.
- This system is mainly used in cars, where the speed of the car can be controlled by using motor driver .

Advantages:

- Alerting the drivers
- It provides safety.
- Autonomous driving.

Conclusion and Future enhancement:

The work described in this paper is split into three parts, similar to other applications in the field, as "detection" , "recognition" and controlling. For the detection part, shape-based algorithms were used because color-based segmentation is much less reliable than shape-based segmentation.

Speed sign detection in different conditions like lighting, disorientation was not tested well. In this proposed method road side speed signs are monitoring and speed of the car can be controlled based on the speed signs. If the car travel with high speed than the speed limit showing on the speed sign then the speed of the car will be controlled. For future work, the use of car's dynamics (direction, trajectory, speed changes etc.) should be considered to improve the system's robustness of the speed sign reading process. The system is designed as to stop motor when any sign is observed on the sides of road. In future, the pixel intensity can be increased in order to get clear image capture and it can be further implemented in zonal areas by using advanced cameras.

III. REFERENCES

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