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Road Sign Recognition System Using Raspberry Pi

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ABSTRACT:Road sign recognition is one of the important tasks of intelligent transportation systems (ITS). The project aims at implementation of road sign detection and control of an autonomous vehicle using Cascade Classifier algorithm. In this proposed work, the system automatically detects the roadsigns, controls the vehicle and commands certain actions. The system consists of Raspberry Pi 3 processor and web camera which automatically captures the video data and converts them into number of frames which are processed bythe proposed algorithm in OpenCV to detect the road sign and control thevehicle. Based on the detected sign, the vehicle is controlled by DC motorsinterfacedwithRaspberryPi.TheexperimentalresultsforPeakSignaltoNoiseRatio (PSNR) and Minimum Mean Square Error indicate the proposed systemgives more accurate results with higher PSNR value compared to Hough Transformation.

KEYWORDS: ITS, Raspberry Pi, PSNR

I. INTRODUCTION

Automatic Road sign detection and recognition is an imperative errand of Advanced Driver Assistance Systems, has been of incredible enthusiasm for ongoing years for unmanned vehicles. It enhances safety by informing the drivers about the current state of traffic signs on the road and giving valuable information about precaution. Road signs are placed either at the sides of road or above as navigation guides. With continuous raise in road traffic, mishaps chances likewise raises. Road safety statistics demonstrate that about 1.24 million people die annually on road due to accidents. Thus, the research has focused in recent years on intelligent systems that can avoid the collisions and mishaps. They are developed to enhance Road safety and driving comfort. This system introduces a method of road detection using Raspberry Pi for self-driving car. When vehicles are moving on the road, it is difficult to find road sign such as lane, crosswalk, stop line, turn left, turn right etc., only using a single camera. A web camera mounted on the moving prototype vehicle captures the image and processes the image using Haar Cascade Classifier.

II. RELATED WORK

Radio Frequency Identification (RFID) system is looked upon as one of the top ten important technologies in the 20th century. According to the investigation of the AMR Research, the willingness for using RFID tags exceeds 85% based on 500 USA enterprises.[1] AGV are gaining importance and finding increased utility in both commercial and industrial purposes. AGV are computer controlled, unmanned, highly flexible and intelligent mobile vehicles (usually Battery operated) installed with intelligent guidance systems such as optical, magnetic or laser for automated functionality characterized as either towing or load carrying.[2] Cloud Computing (CC) is considered as an efficient technology to process data due to its computation power and capabilities.These capabilities are used by applications such as the Internet of Things (IoT) devices.[3] Employing proper mechanisms to prevent and stop attacks on driver-less cars is an important step to their adoption. Currently, vehicular ad hoc networking (VANET) and artifical neural networks (ANNs) are used in driver-less cars to prevent and stop attacks.[4] Several Convolutional Neural Networks (CNNs) are adapted to map raw pixels from front-facing cameras directly to steering signals and the results are reported here. This transfer learning approach proved successful.[5] AmolJayant Kale and R.C.Mahajan have proposed a methodology for street sign acknowledgment framework which getting the traffic sign image from the moving vehicle. In this paper the framework gets separated into two phases. The primary stage is utilized as an identification part which recognizes the street sign coordinated with the database and second part is arrangement organize that is to characterize the distinguished signs which is taken from the principal arrange. Every one of the image are put away in database. In the identification arrange, the info picture taken is a YCBCR shading space distinguishes the street signs by utilizing

shape separating technique. At last the arrangement module decides the scene pictures which is identified by utilizing an Artificial Neural Network (ANN). The recreation appeared in this framework creates a steady extraction of scene image for the location of the signal.

III. PROPOSED ALGORITHM

The above mentioned papers reveal about the concepts of image processing technique to detect various road signs in the Intelligent Transportation Systems (ITS) using various algorithms and methodologies. In all the above papers, they defined different Image processing approaches for road sign detection and classification only for image detection which does not concentrate on vehicle control. The project proposes a prototype of vehicle mounted camera to capture and detect road signs for an autonomous vehicle using Raspberry Pi through open CV platform. The Digital image processing technique plays important role in the sign capturing and detection system. The Haar cascade classifier algorithm used to take the necessary action for recognizing the captured
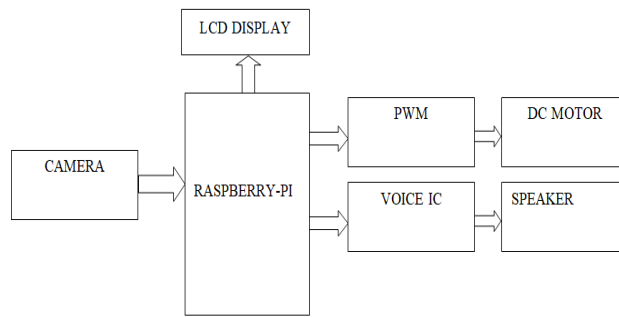

Figure 1 Block Diagram

Raspberry Pi
The Raspberry Pi is manufactured in three board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell),RS Components and Ego man. These companies sell the Raspberry Pi online. Ego man produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

Web Camera
Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos

IV. SIMULATION RESULTS

According to the system it analyses children Activities with Video Enhancement and Instant WEB App Notification for Better Monitoring of Baby. Atomization of System with Real-Time Database in the cloud, accurate sensors make the monitoring of the baby easy. This system is made in the consideration of giving comfort to working parents. This system can be very much useful for them. It also enhances the use of IOT. People can use the technology to make them more comfortable and quick. A Smart baby room can be like blessing for the parents. They don't need to pay for maids or caretakers for their babies. They can trust on the system because machines are more reliable than humans.
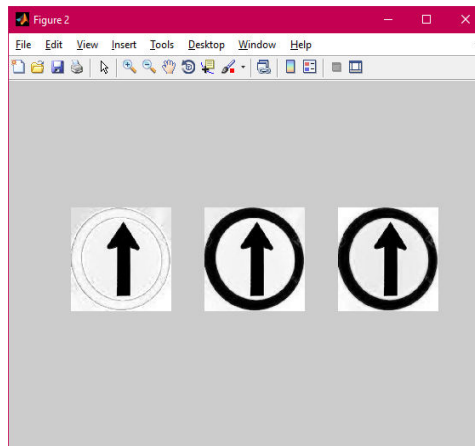
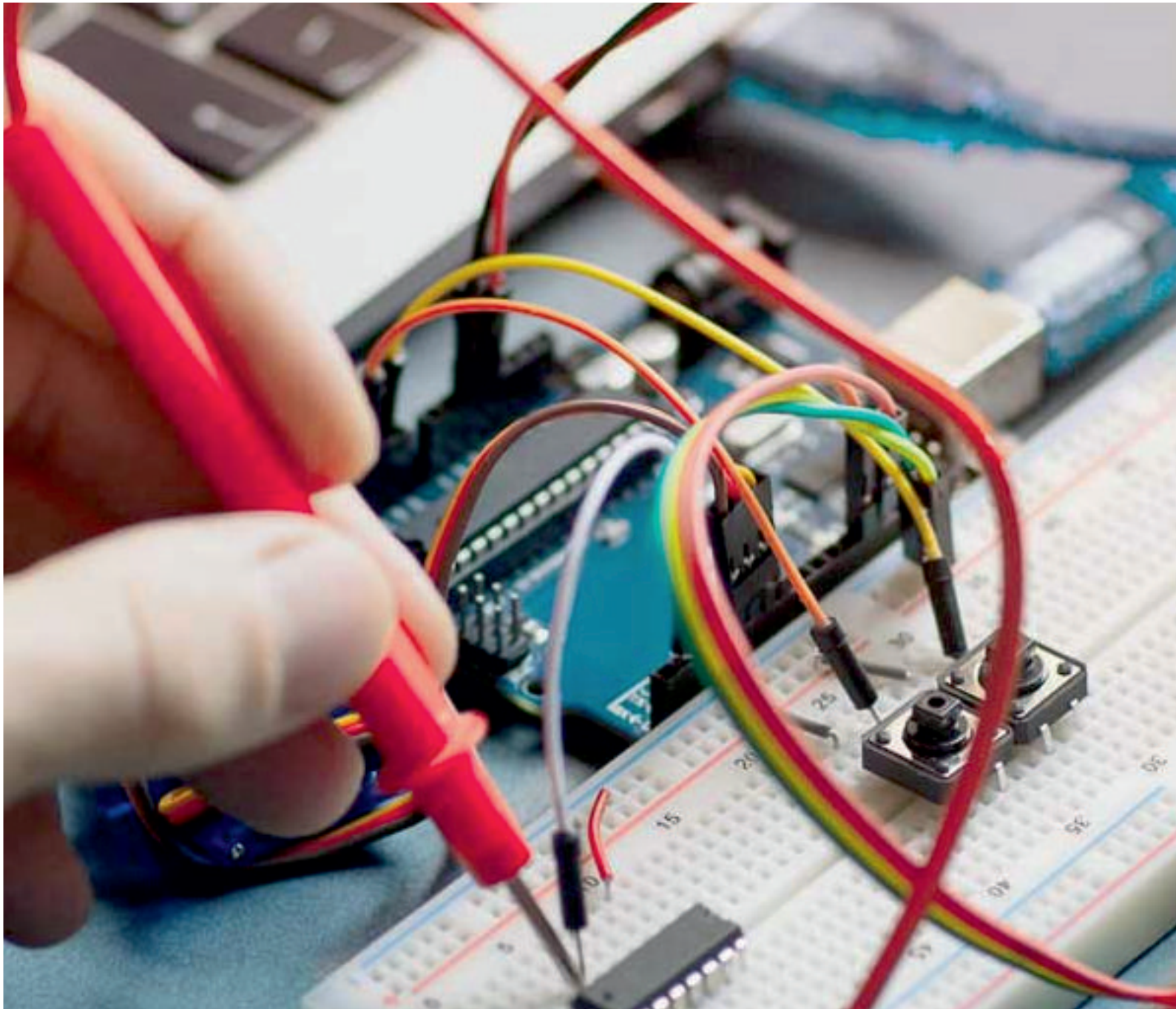**Figure 2** Simulation Output

Figure 3 Prototype

V.CONCLUSION

The system consists of Raspberry Pi 3 processor and web camera which automatically captures the video data and converts them into number of frames which are processed by the proposed algorithm in OpenCV to detect the road sign and control the vehicle. Road sign detection and vehicle controlling without the driver is the main objective of this paper. This paper explained the system architecture and the process of the project. Ultrasonic sensor fixed in front of the car, if it gets disturbed with the connections then the program couldn't run.

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