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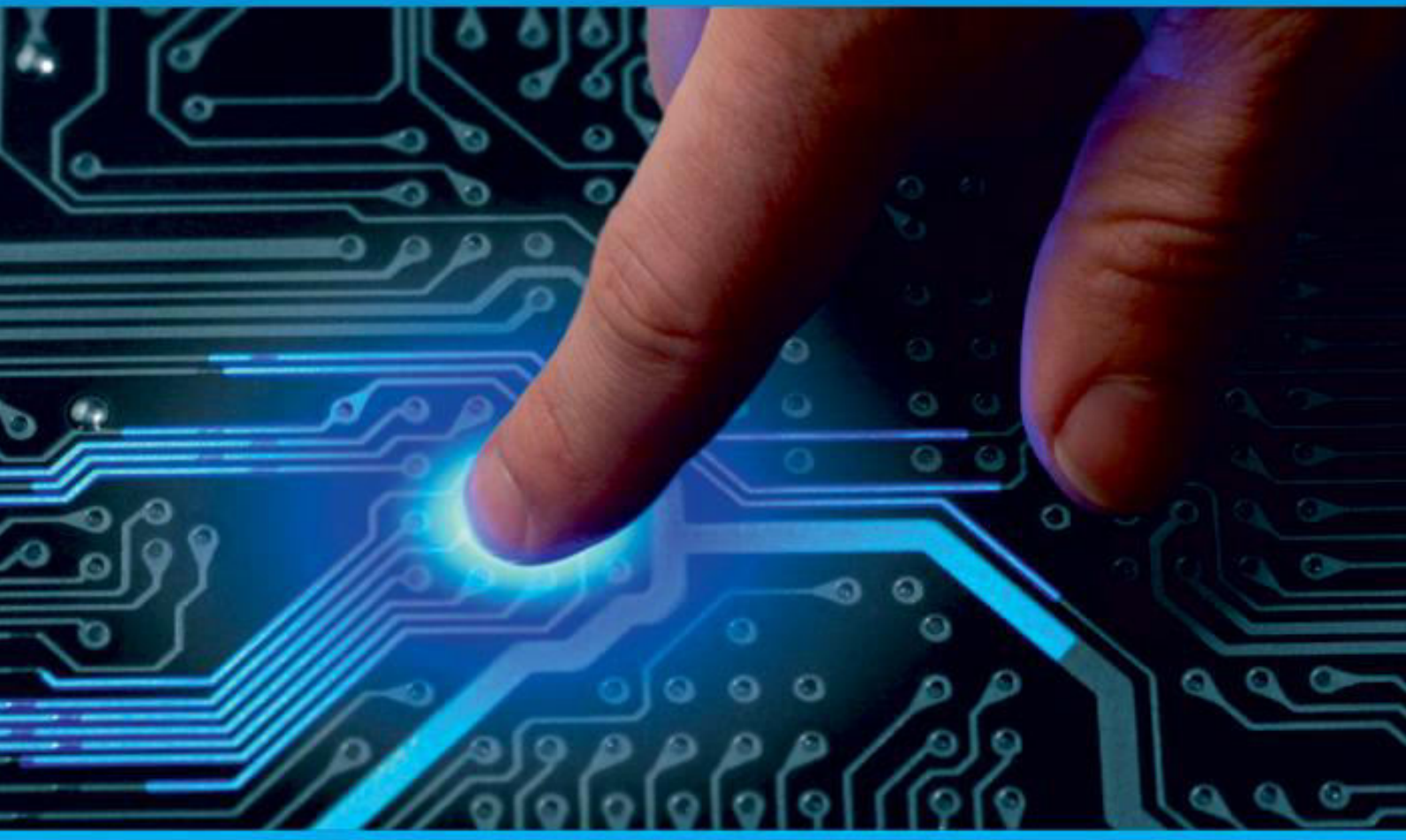

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Implementation towards Traffic Sign Recognition and Accident Avoidance

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ABSTRACT: Traffic sign recognition is used to maintain traffic signs, warns the distracted driver, and prevent his/her actions that can lead an accident. A real-time automatic sign detection and recognition can help the driver, significantly increasing his/her safety. Traffic sign recognition also gets an immense interest lately by large scale companies such as Google, Apple and Volkswagenetc. driven by the market needs for intelligent applications suchas autonomous driving, driver assistance systems (ADAS), mobile mapping, Mobil eye, Apple, etc. and datasets such as Belgian, German mobile mapping. Hence, in this paper , we are proposing to do the same with cost efficient manner using Raspberry Pi.We are proposing automated real time system which will capture traffic sign and indicate it at driver dashboard with front obstacleexact distance on monitor. PiCam is used to capture images of traffic sings and is connected to RaspberryPi. Monitor is usedto display required output, showing type of sign and distance of collision. This proposal will avoid large number of accidentsoccurring at bridges and work in progress area due to automated braking system and simultaneous reduce death ratio.

KEYWORDS: PiCAM, Raspberry Pi, Ultrasonic sensors, Traffic Sign recognition, Accident Avoidance.

I. INTRODUCTION

According to the world accident report, India has highest number of road accidents. Road accidents have earned India
a dubious distinction. With over 130,000 deaths annually, the country has overtaken China and now has the worst road traffic accident rate worldwide. As many as 1, 39, 091 people lost their lives in 4, 40,042 road accidents in the country last year. The statistics released by the National Crime Records Bureau (NCRB) 1, 18, 533 of the victims were male. They include 11,571 pedestrians. The 28 States together accounted for 1, 36,771 deaths and the seven Union Territories for the remaining. Tamil Nadu tops the list of with 16,175 deaths in 67,757 accidents, followed by Uttar Pradesh with 15,109 deaths in 24,478 accidents. Andhra Pradesh is third with 14,966 deaths in 39,344 accidents and Maharashtra fourth with 13,936 deaths in 45,247 accidents. The Capital city of Delhi accounts for about 1,866 deaths in 6,937 accidents. The states in India like Tamil Nadu, Uttar Pradesh and Andhra Pradesh accounted annually for 15.4, 10.3 and 10.1 of the road accidents in the country. So, it becomes more import to increase security at traffic road to avoid such hazards. We must make vehicle driver more aware about traffic signs and breaking distance. Sometimes driver has all knowledge about traffic signs but while driving they neglect traffic signs which result in accidents. Sign detection is mainly used to assist the driver and give commands through audio feedback, consequently decreasing the number of accidents. The objective of this work is to formulate a method for traffic light detection and detection of sign boards. With the help of this method, one can accurately detect traffic light colors i.e., red and green, and different signs like forward, turn left, turn right and turn back. Road signs make use of colors as a basis for distinguishing it from other objects. Computer vision is used in the field of intelligent transport systems. Lately, the traffic sign recognition systems have become an integral part of Advanced Driver. Assistance Systems (ADAS). In some cases, vehicle in front of use applies break suddenly due to any reason and we are unable to respond it so fast and front collision occurs. Hence, we have proposed a system using raspberry pi and PiCam with ultrasonic sensor, which will alert driver about traffic signs coming on road and Simultaneously avoid front collision using automatic breaking after vehicle enters in breaking distance zone .

II. RELATED WORK

Research and Application of Traffic Sign Detection andRecognition Based on Deep Learning, Now days, with therapid development of society and economy, automobiles havebecome almost one of the convenient modes of transport forevery house-hold. This makes the road traffic environmentmore and more complicated, and people expect to have anintelligent Vision-assisted application that provide drivers withtraffic sign information, regulate driver operations, or assistin vehicle control to ensure road safety. As one of the moreimportant functions, traffic sign

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detection and recognition, has become a hot research direction of researchers at home and abroad. It is mainly the use of vehicle cameras to capture real-time road images, and then to detect and identify the traffic signs encountered on the road, thus providing
accurate information to the driving system. However, the road conditions in the actual scene are very complicated. After many years of hard work, researchers have not yetmade the recognition system practical, and further researchand improvement are still needed. Traditionally, trafficsignage has been detected and categorized using standardcomputer vision methods, but it also takes considerable timeto manually process important features of the image. With thedevelopment and progress of science and technology, moreand more scholars use deep learning technology to solve this
problem. The main reason that the deep learning method is widely accepted is that the model can learn the deep features inside the image autonomously from the training samples, especially for many cases that do not know how to design the feature extractor, such as expression recognition, target detection Wait. Based on the application of road traffic sign detection and recognition, this article focuses on the correctness and high efficiency of detection and recognition[1].

Traffic Light and Sign Detection for Autonomous LandVehicle Using Raspberry Pi, This work aims to implementtraffic light and sign detection using Image processingtechnique for an autonomous and vehicle. Traffic SignRecognition system is used to regulate traffic signs, warn adriver and command certain actions. Fast robust and real timeautomatic traffic sign detection and recognition can supportthe driver and significantly increase driving safety. Automaticrecognition of traffic signs is also important for an automatedintelligent driving vehicle or for a driver assistance system.This is a visual based project i.e., the input to the system isvideo data which is continuously captured from the web cam isinterfaced to the Raspberry Pi. Images are pre-processed withseveral image processing techniques such as; Hue, Saturationand Value (HSV) color space model technique is employedfor traffic light detection, for sign detection again HSV colorspace model and Contour Algorithm has been used. The signsare detected based on Region of Interest (ROI). The ROIis detected based on the features like geometric shape andcolor of the object in the image containing the traffic Signs [2].

Towards Real-Time Traffic Sign Detection andClassification, Traffic sign recognition plays an importantrole in driver assistant systems and intelligent autonomousvehicles. Its real-time performance is highly desirable inaddition to its recognition performance. This paper aims todeal with real-time traffic sign recognition, i.e., localizingwhat type of traffic sign appears in which area of an inputimage at a fast processing time. To achieve this goal, wefirst propose an extremely fast detection module, which is20 times faster than the existing best detection module. Ourdetection module is based on traffic sign proposal extractionand classification built upon a color probability model anda color HOG. Then, we harvest from a convolution neuralnetwork to further classify the detected signs into their subclasses within each super class. Experimental results on bothGerman and Chinese roads show that both our detectionand classification methods achieve comparable performancewith the state-of the-art methods, with significantly improvedcomputational efficiency [3].

Road Sign Recognition System on Raspberry Pi, The paperdescribes the characteristics of speed signs, requirementsand difficulties behind implementing a real-time base systemwith embedded system, and how to deal with numbersusing image processing techniques based on shape anddimension analysis. The paper also shows the techniquesused for classification and recognition. Color analysis alsoplays a specifically important role in many other differentapplications for road sign detection, this paper points tomany problems regarding stability of color detection due todaylight conditions, so absence of color model can led abetter solution. In this project lightweight techniques weremainly used due to limitation of real time based applicationand Raspberry Pi capabilities. Raspberry Pi is the main targetfor the implementation, as it provides an interface betweensensors, database, and image processing results, while alsoperforming functions to manipulate peripheral units (usbdongle, keyboard etc.) [4].

A Survey of Traffic Sign Recognition, Advanced DriverAssistance Systems (ADAS) refer to various hightech invehicle systems that are designed to increase road trafficsafety by helping drivers gain better awareness of the roadand its potential hazards as well as other drivers aroundthem. The design of traffic sign recognition, one importantsubsystem of ADAS, has been a challenge problem formany years and hence become an important and activeresearch topic in the area of intelligent transport systems.The realization of a real-time traffic sign recognition systemis usually divided into three stages: detection, tracking andclassification. This paper introduces the main difficultiesin road sign recognition and briefly surveys the state-ofthe-art technologies in this field with further discussions onthe potential trend of development of road sign recognition [5].

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A Road Sign Detection and the Recognition for DriverAssistance Systems, Explores the effective approach ofroad sign detection and recognition for Driver AssistanceSystems (DAS). In today's world road conditions drasticallyimproved as compared with past decade. Express highwaysequipped with increased lane size made up with cementconcrete. Obviously speed of the vehicle increased. So ondriver point of view there might be chances of neglectingmandatory road sign while driving. This paper illustratesproposed system to help driver about the road sign detectionto avoid road accidents. The automatic road-signs recognitionis an important part of Driver Assisting Systems which helpsdriver to increase safety and driving comfort. In this paperan efficient approach for the detection and recognition of theroad sign in the road and acquiring the traffic scene imagesfrom a moving vehicle is present. In this paper the road signrecognition system is to be divided into two parts, the firstpart is detection stage which is used to detect the signs froma whole image, and the second part is classification stagethat classifies the detected sign in the first part into one ofthe reference signs which are presents in the dataset. In thedetection module segments, the input image in a YCBCRcolour space, and then it detects road signs by using the shapefiltering method. The classification module present determinesthe type of detected road signs by using an artificial neuralnetwork (ANN). The extensive experimentation has shownthat the proposed system approach is robust enough to detectand the recognize road signs under varying lighting, rotationand translation conditions [6].

Towards Reliable Traffic Sign Recognition, Describesrobust system architecture for the reliable recognition ofcircular traffic signs. Our system employs complementingapproaches for the different stages of current TSR systems.This introduces the application of local SIFT features forcontent-based traffic sign detection along with widely appliedshape-based approaches. We further add a technique calledcontracting curve density (CCO) to refine the localization ofthe detected traffic sign candidates and therefore increase theperformance of the subsequent classification module. Finally,
the recognition stage based on SIFT and SURF descriptionsof the candidates executed by a neural net provides a robust classification of structured image content like traffic signs.By applying these steps we compensate the weaknessesof the utilized approaches, and thus, improve the system'sperformance [7].

Collision Detection and Avoidance System For Vehicle,Introduce an alarming and response system for movingvehicle using ultrasonic ranging device (URD) whichis a combination of a transmitter, a receiver and a singleprocessing device and a microcontroller. The system calculatesthe minimum safety distance and alarm the driver if distanceis low. And if driver doesn't slow down the vehicle thenthe system will itself apply the brakes and slow the vehicle [8].

Intelligent Transportation System for Accident Preventionand Detection, Provides an intelligent system for two wheeler accident prevention and detection for human life safety. Theprevention part involves, Smart Helmet, which automatically
checks whether the person is wearing the helmet and hasnon- alcoholic breath while driving. The relay does notON the engine if these two conditions are not satisfied.The microcontroller controls the function of relay andthus the ignition. The system also enables detection of anaccident at any place and reports about the accident topredefined numbers with GSM module. The Microcontrollercontinuously records all the parameters of automobile forprevention and detection of accident [9].

A Practical Animal Detection and Collision AvoidanceSystem Using Computer Vision Technique, In this paper,we discussed the necessity of automatic animal detectionsystem and our algorithm for animal detection based onHOG and cascade classifier. The algorithm can detect ananimal in different conditions on highways. The proposedsystem achieves an accuracy of almost 82.5 regardinganimal (cow) detection. Estimation of approximate animaldistance from the testing vehicle is also done. Thoughthe proposed work has been focused on automatic animaldetection in context to Indian highways, it will work in othercountries also. The proposed method can easily be extendedfor detection of other animals too after proper trainingand testing. The proposed system can be used with otheravailable, efficient pedestrian and vehicle detection systemsand can be offered as a complete solution (package) forpreventing collisions and loss of human life on highways [10].

A normal human can simply identify any written or typed or scanned text, numbers, etc., but when it comes to a device, it is not easy to find out what accurately that given text or numbers. It will be not easy to identify a handwritten digit for a device. Many machine learning methods used to fix the handwritten digit recognition problem. It is growing in more not easy domains, so its training complexity is also increasing. To beat this complexity problem, many algorithms have been implemented. In this paper, the Convolution Neural Network (CNN) and Particle Swarm Optimization (PSO), those two approaches use for recognition of the isolated handwritten digit. Customized PSO is used to reduce the overall computation time of the proposed system.[11].

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In this paper mangoes are graded in four types like Green Mango, Yellow Mango and Red Mango which are based on machine learning method. This system considers RGB values size and shape of mangoes. Following analysis is used to obtain good probability. This helps to train system to identify appropriate maturity of mangoes. This research is conducted on two machine learning method i.e. Naive Byes and SVM (Support Vector Machine)[12].

III. SYSTEM ARCHITECTURE

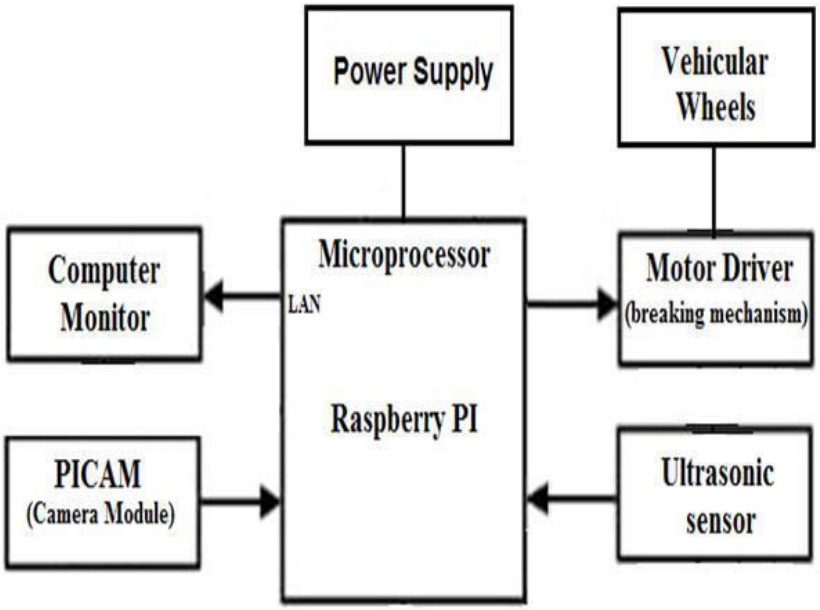

Fig: System Architecture

IV. PROPOSED SYSTEM

The system includes two sensors attached to Raspberry Pi. The first sensor is ultrasonic sensor which helps to detect any vehicles or obstacles in front of our vehicle. The second sensor includes Pi Cam which captures images. These images are analysed.To perform the analysis for image,features extraction is done using

following steps: Capture input images using pi camera Crop the area of Sign board.

1. Extract parameters like arrows by threshold segmentation (remove noises, Morphological operations).
2. Calculate geometrical properties (Area and perimeter) calculate the roundness value.
3. Classification algorithm to identify Traffic Signs.

Thus deep learning is used to identify the Traffic signal and signify the same.

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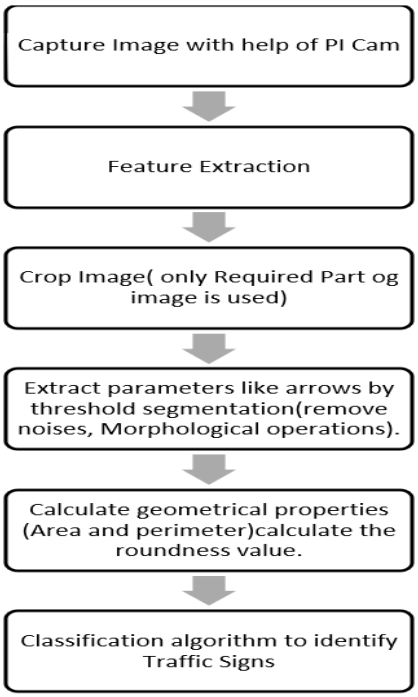

FIG: FLOW CHART

V. PROPOSED ALGORITHM

A. K-Means Algorithm

Input: a dataset of points P=p1,...,pn, a number of cluster k
Output: centers c1,...,ck implicitly dividing p into k clusters
1) choose k initial centers C= c1,...,ck
2)whilestopping criterion has not been met
3)doassignment
4)fori=1,...,N
5)dofind closest center cK E C to Instance pi
6)dofind closest center cK E C to Instance pi
7) assign instance pi to set ck
8) update step: 4
9)fori=1,...,k
10)doset ci to be center of mass of all points in ci

B. Grayscale Algorithm

Steps:1. Get the red, green, and blue values of a pixel.
2. Use fancy math to turn those numbers into a single grayvalue.
3. Replace the original red, green, and blue values with thenew gray value.
ConversionFactor = 255/(NumberOfShades-1)
AverageValue = (Red +Green+Blue)/3
Gray=Integer((AverageValue/ConversionFactor)+0.5)*ConversionFactor.

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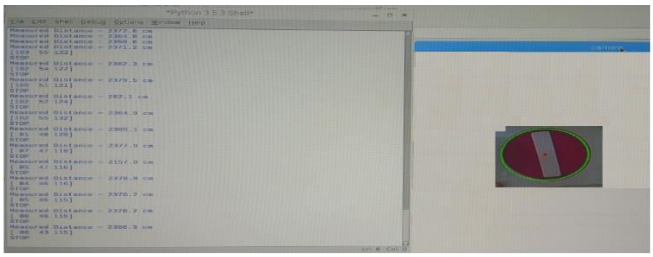
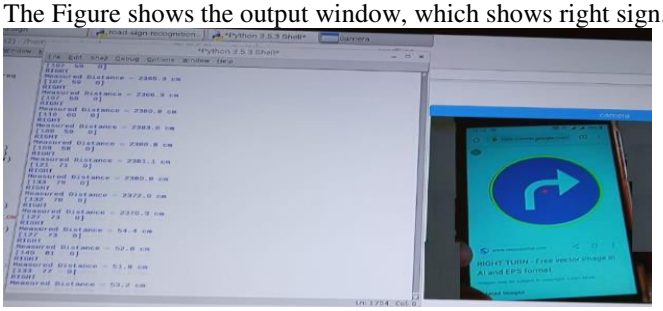
VI. RESULT ANALYSIS

A) The figure shows the output window, which shows stop sign.

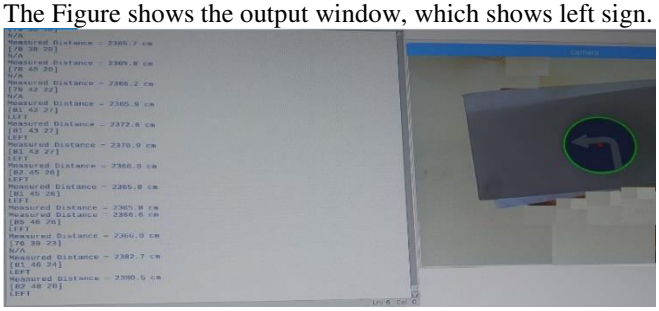


B) The Figure shows the output window, which shows right sign.



This output shows user need to turn right.

C) The Figure shows the output window, which shows left sign.



Thisoutput shows user need to turn left.

VII. CONCLUSION AND FUTURE WORK

Proposed system will detect the sign board and Alert thedriver with respective alert but if driver has neglected the Sign board alert the automated braking will be activated byRaspberry Pi. On the other hand, system will continuouslytrack front vehicle distance using ultrasonic sensor, andbreaks will be applied according to distance.

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