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# AN AUTO PILOT SYSTEM BY EXTRACTING IMAGES ON LIVE VIDEO FRAME 25 FPS AND ROBUST DRIVING EFFICIENCY WITH SPEED CONTROL

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**Abstract:** *This project represents a novel character recognition system using image processing technique Intelligent Speed Adaptation system is based on Circular Hough Transform (CHT). The digits of the speed limit are then extracted and classified using SIFT algorithm which is trained for this purpose. This system has hardware implementation which will control the rate of the vehicle according to detected speed limit in speed control zones like hospitals, school zone, and where people is expected to be crowded. Thus, this image processing-based auto-pilot system recognize the digits of the speed limit in the road side boards from live video streaming by extracting images from the video. The video is converted from 25 fps to 1fps to extract the images from which the images will be scanned to recognize characters that is present in those images. Then the system controls the vehicle accordingly in order to avoid road accidents due to losing control of speed in highly sensible areas. It was found that the accuracy of recognition was 98% which indicates clearly the high robustness targeted by this system.*

***Key Words***: auto-pilot, Circular Hough Transform, collision, robust, speed limit, live video streaming.

## 1. INTRODUCTION

Much research has been done in recent years to advance real-time traffic control systems for controlling traffic on road ways preventing accidents and providing safe transportation, among their things. etc. one goal of these efforts is to realize various applications such as estimating vehicle speeds on highways, determining traffic strength, and if possible directing traffic. We present some of the preliminary findings some our ongoing research project on the problem of real- time vehicle estimating using video images. Any digital video camera that captures images in the visible light spectrum can be used to determine the speed limit. The accuracy of the image is affected by the frame sampling rate, geometric and radiometric resolutions, and distortion amounts of the camera's optical system. The solutions and models for speed estimation problems defer depending on the applications and their end goals. When it comes to technologies for vehicle speed control, there are two key areas to considered traffic surveillances and driver and assistances system, and intelligent vehicle system in most cases, traffic surveillances systems have applications that necessitate the use of cameras. For example, estimation of speed of traffic flow of a roadway at different times and dates, belongs to this group. Besides, there are different applications which require speed information of each area on traffic scenes.

## 2. RELATED WORKS

G. Loy and N. Barnes, Shape-based detection methods detect speed limit signs by exploiting their unique appearance (circle shape). The circular Hough Transform (HT) is the preferred algorithm for circular signs.

N. Barnes and A. Zelensky, "Real-time radial symmetry for speed sign detection," -More recently, Barnes and Zelensky show that the algorithm of RSD can handle noises while maintaining high detection rates and having real-time performance. In addition to color and shape-based detection methods, some researches have used MSERs to detect traffic signs.

Koller, DeBeer, J. Malik, J. robust car tracking with occlusion reasoning –every pixel of the subsequent frame images is subtracted in this manner I(DeBeer) – I(DeBeer + At). This subtraction unit's absolute value is used. Other operations are often performed on image sequences in order to remove object outlines.

Melo, J. Naftel, A. Bernardino, A. Victor J.S uncalibrated traffic surveillance cameras are used to identify vehicle trajectories and lane geometry from multiple viewpoints. Many works for traffic surveillance applications begin with the segmentation of motion objects, and background subtraction methods are commonly used for this purpose.

R. Malik, J. Khurshid, and S. N. Ahmad., Road sign detection and recognition using color segmentation, shape analysis and template matching," - Template matching or learning-based classification strategies are commonly shown in the recognition stage. Malik et al. proposed a vehicle detection module focused on pattern recognition. Artificial Neural Networks (ANNs) and Neural Networks (SVMs) have been extensively studied for learning-based classification. Recently, Convolution The neural network (CNN) has been used to identify traffic signs and has a high level of accuracy; however, huge computing resources are normally needed and during training or assist to evaluate.

## 3. EXISTING SYSTEM

The existing system demonstrated include RGB to Red conversion for getting the red component in the image, filters which perform the task of noise reduction as well as edge detection, thresholding and segmentation to get the desired traffic sign from image. The system has been successfully implemented in MATLAB and it works productively and efficiently with the Indian traffic signs database developed as part of the project. The disadvantage of this existing system is it has no video frame detection of speed limit sign and it only detects the traffic sign images in image processing technique.

## 4. METHODOLOGY

The proposed speed-limit sign recognition system based on live video frame. The first step, the preprocessing stage, enhances the input video frame camera; the 25fps live video frame is converted to 1 fps. The recognition stage extracts Hough transform features from the candidate regions. In the recognition stage, Hough transform features will be extracted from the presence of speed limit signs is solid, with circle shapes and high-contrast colors. After Hough transform features are computed, the generated feature vectors will be the input to SIFT algorithm for classification of speed-limit signs. If the speed limits are predicted, the speed can be limited by using hardware setup. In hardware driver motor will be controlling the speed limit based on the speed limit signs. The main objective of this system is detecting and recognizes speed-limit signs and various sign boards automatically and also determine the system potential speed-limit sign regions by detecting Hough transform. This proposed device detects and recognizes speed-limit signs with high precision and robustness.

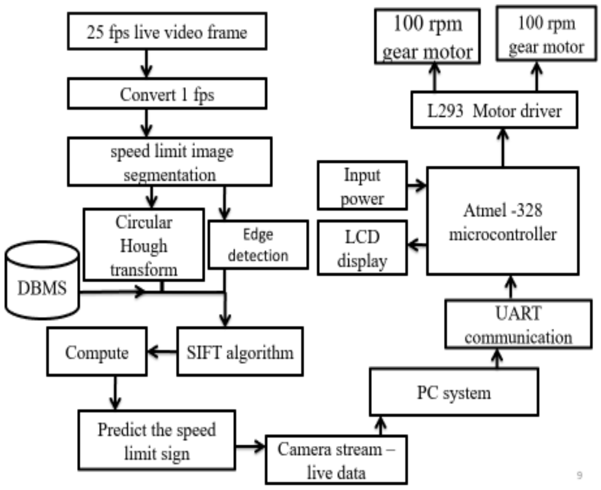



**Fig 1:** Proposed System Flow Chart

The 25-fps live video frame captures the live video while car is moving. The segmentation method is used to separate the captured video into images. By using circular Hough transform it detects the circles in imperfect images in digital image. In sift algorithm it locates the certain key points and features in digital images and detects the sign boards. The L293 motor driver is used to control the rate of the car. The 100-rpm gear motor is connected with L293 motor driver.

The flow chart mainly involves 4 process which includes:

**SIFT ALGORITHM**

SIFT is quite an involved algorithm. There are mainly four steps involved in the SIFT algorithm.

- **Selection of a scale-space peak**: A possible position for locating features.
- Crucial question accurately locating the function main points is known as **localization.**
- **Allocating Orientation to Key Points**: Assigning orientation to key points
- **Key point descriptor & key point matching**: A high-dimensional vector is used to describe the key points.

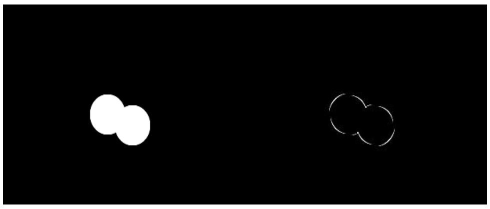
**SEGMENTATION PROCESS**

Segmentation of image is the method of partitioning a digital image into different subdivisions (of pixels) called Image Objects, which can lessen the image's complexity and make analyzing it easier. To break and group a specific collection of pixels from an image, we use various image segmentation algorithms. Through doing so, we're simply assigning labels to pixels, and pixels with the same label are grouped together because they have something in common. We can define borders, draw lines, and distinguish the most important objects in an image from the rest of the less important ones using these marks.

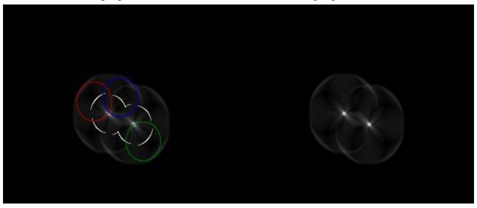
**CIRCLE HOUGH TRANSFORM**

The flow of events is:

1. Load an image
2. Detect edges and generate a binary image
3. For every 'edge' pixel, generate a circle in the ab space
4. For every point on the circle in the ab space, cast 'votes' in the accumulator cells
5. The cells with greater number of votes are the centers



(a) (b)



(c) (d)

**Fig 2:** circular Hough transform image detection process (a) detect edges to get an image (b) white pixel in the above image, you create a circle in the ab-space (c) The horizontal axis is the 'a' axis, the vertical axis is the 'b' axis. The brighter a spot, more the number of votes case at the point of centre (d) in the above image, three random points are choosing. The circle radius R is drawn around them.

**EDGE DETECTION**

Image processing technique also includes edge detection for detecting object boundaries within images. It operates by detecting brightness discontinuities. In fields like image processing, computer vision, and machine vision, edge detection is used for image segmentation and data extraction. Sobel, Canny, Prewitt, Roberts, and fuzzy logic methods are all popular edge detection algorithms.

**Fig 3:** Image segmentation using the Sobel method.

## 5. ADVANTAGE OVER EXISTING METHOD

- The advantages of this proposed system are it will detect the speed limit signs accurately and controls the speed.
- It avoids the accidents in sensitive areas.
- Alert message is displayed to reduce the speed.
- It has high accuracy and robust system in detection.

## 6. EXPERIMENTAL RESULTS

**Fig 4:** Proposed system Experimental setup

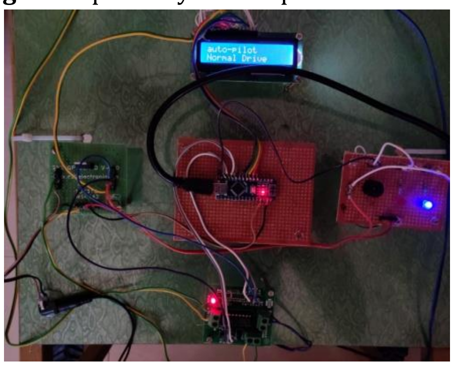


**Fig 5:** Proposed active condition of the system.

We have implemented an auto pilot system which is illustrated in fig. And software is developed to detect the sign board using image processing technique by AI technology with accuracy of 98% and robust efficiency in controlling the velocity of the vehicle.


**Fig 6:** proposed system of auto pilot speed system


**Fig 7:** proposed system results of auto pilot system

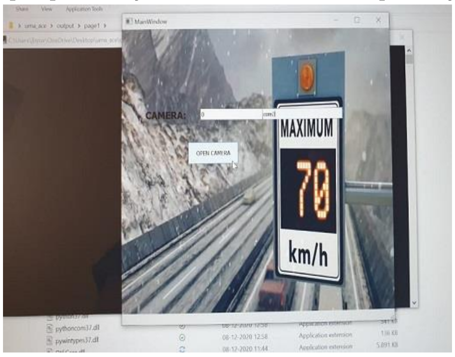



**Fig 8:** software window to detect the sign boards

## 7. CONCULSION

In this project, we have explained the real time speed control of vehicle according to the speed limit in the road sign board in roadways. Speed limit will be obtained by the system using image processing technique which is based on artificial intelligence. The accuracy of the evaluated speed had been obtained. Real-time video monitoring and video conversion into image frames will ensure the speed control of the vehicle as more reliable and it will be performed at right time which will reduce the loss of human lives in road accidents due to over speed of the vehicles which is more than the speed limit in that particular traffic scene.

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