Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 04, April -2018

TRAFFIC LIGHT DETECTION SYSTEM FOR VISUALLY IMPAIRED PERSON WITH VOICE SYSTEM

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ABSTRACT: *This projects main focus is to give a better and much more efficient solution for a well known problem. The project chooses to tackle a problem, which concern the visually impaired community Road crossing; And to be more precise: Pedestrian Traffic Light Recognition. Blind person will have camera on his head which will capture the image and video of traffic signal. The input of the system is a continues traffic video sequence or image of traffic light, which first will be separated into individual image frames for further processing. By using image processing system will calculate the time mention on the traffic signal. Blind persons will receive the audio clip regarding the seconds remaining for dispatching the signal.*

KEYWORDS: *Median Filter, Image Frames, image processing, Segmentation, Classification*

I. INTRODUCTION

World Health Organization gives statistics results that there are 285 million visually impaired people, out of which 39 million are totally blind [1]. They are facing a lot of difficulties in their day to day life. There are many systems like white cane and guide dogs to assist the visually impaired people. About 90 percent of visually impaired people are living in low income setting and so the guidance system should be designed in such a way that incurs low cost. Many guidance systems are proposed in the Past to ease the mobility of visually impaired people. A variety of technique are there which a blind person frequently uses such as white cane or walking stick for navigation. But still the blind people cannot cross the traffic signal on their own and depend on others to cross the road and traffic signal. So, on taking this into consideration we decided to design a product which would help the blind people specifically cross the road as in [3]. This project involves helping the blind to recognize traffic signal to cross traffic signal without depending on others. In this project will be studied three important model, 1. Traffic light detection2. Cross watch System 3. Audible Pedestrian Signals

II. REVIEW OF LITERATURE

This section describes few recent papers which have proposed the idea of traffic light detection system for visually impaired person.

[1] Pedestrian Traffic Light Recognition for the Visually Impaired

Author: Amir Shalev ; Ben Lauterbach
This papers main focus is to give a better and much more efficient solution for a well known problem. Author chooses to tackle a problem, which concern the visually impaired community Road crossing; And to be more precise: Pedestrian Traffic Light Recognition. In this work author employ the technology of computer vision for solving this issue. Our approach is mainly based on color segmentation. The system is able to detect and to track green and red traffic lights used by the pedestrians.

Advantages: Paper Approach is mainly based on color segmentation

Limitation: Equipment used in this paper not available at every road crossing and also makes unbearable noise.

[2] Automatic Voice Generation System after Street Board Identification for Visually Impaired

Author: Pravin A. Dhulekar, Niharika Prajapati
The Paper is based on design implementation of smart hybrid system for street sign boards recognition, text and speech conversions through character extraction and symbol matching. The default language use to pronounce signs on the street

boards is English. In this work author are proposing a novel method to convert identified character or symbol into multiple languages like Hindi, Marathi, Gujarati, etc.

Advantages: The other languages are also considered in this paper.

Limitation: Sign Board detection algorithms have high time complexity.

[3] Smart Navigation System For Visually Impaired people

Authors: Dr. X.Anita, R.Abirami, M.Epsi Vennila

This paper presents new detection system for signal light detection. This system helps in guiding the visually impaired populace to cross the road in safety with the help of hand held devices. The colour of traffic light is detected and informed via the buzzer. Ultrasonic sensors detect obstacles in their path .With the help of this information the visually impaired people cross the road safely.

Advantages: In this paper traffic light signals are informed by buzzer have a great advantage over other systems.

Limitation: This paper uses the sensors which can be fail at any moment.

[4]Pedestrian Protection Systems: Issues, Survey, and Challenges

Authors: Tara Gandhi and Mohan Manuji Trivedi

This paper gives the recent study on the ordinary safety and challenges surrounding the problems of blind peoples. It gives a complete evaluation of investigate hard work happening dealing with pedestrian protection and accident prevention.

Advantages: The theme of this paper is very much efficient for the blind peoples.

Limitation: Collision avoidance algorithm has less accuracy than other algorithm

III. SYSTEM ARCHITECTURE / SYSTEM OVERVIEW

Following figure shown as process of the proposed Architecture,

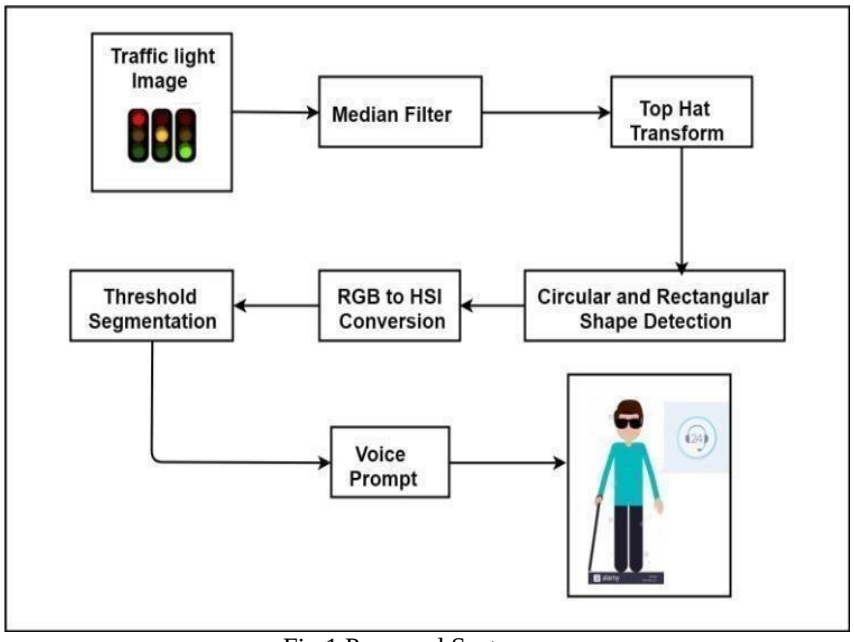

Fig.1.Proposed System

A. Architecture:
People who are visually impair struggle every day in performing their events. One of most difficult problem faced by visually impaired people is detecting signal lights at crossroads. This paper presents new detection system for signal light detection. Camera will be mounted on the head of the blind person and video will be capture through it. After that video will converted into series of frames and frames will be taken as input to our system. Image processing will be performed on the input image and seconds on the traffic signal light will calculate using image processing. Three important modules will be studied in this project,

B. Module
1. Traffic light detection: In this first module detect the traffic light using shape and color detecting algorithms such as feature extraction, color segmentation and edge detection algorithms.
2.Cross watch: The functionality give help to the user accomplish proper arrangement with the cross walk and read the position of walk lights to know when it is time to cross the road and wait for new signal surface.
3. Perceptible Pedestrian Signal, APS, is a device that communicates in order about walker timing in a no illustration format such as capable of being heard tones, verbal messages, and/or vibrating.

C. Algorithm Used
1) Median Filter for image Preprocessing: Median filtering is a method used to eliminate noise from descriptions. It is generally used as it is very useful at remove noise while preserving boundaries. It is mostly effectual at removing salt and pepper type noise. Particularly, the medium filter replaces a pixel by the median, In its place of the standard, of all pixels in neighborhood

$$Y [m; n] = median [i; j]; (I; j) \text{ ……..(1)}$$

Where is a area defined by the user, centered around position[m,n] in the image.

2) Circular and Rectangular shape detection Algorithm:

i) Circular Hough Transform (For Circular shape)

The Hough renovate can be used to resolve the parameter of a loop when a number of points that fall on the edge are known. A circle with radius and center (a,b) can be describe with the parametric equations

$$x = a + R\cos() \text{ …….. (2)}$$
$$y = b + R\sin() \text{ …… (3)}$$

ii) Canny edge detection (For rectangular shape)

The Canny edge detector is a border discovery operative that uses a multi-stage algorithm to distinguish a broad range of edges in descriptions. The procedure of Canny edge detection algorithm work on 5 different steps.
1. Relate Gaussian clean to level the picture in order to eliminate the superfluous noise near on the picture.
2. Discover the concentration gradient of the picture.
3. Concern non-maximum inhibition to get rid of imitation reaction to edge finding.
4. Affect twice threshold to find out possible edges [for select edge]
5. Confirm the discovery of edges by suppress all the other edges that are weak and not associated to sturdy edges.

3) Threshold Segmentation: Simple formula for the threshold segmentation is:

$$\text{If } f(x, y) \text{ is a greater than T then } f(x, y) = 0 \text{ else } f(x, y) = 255$$

By using above formula we can calculate the threshold value and can do the segmentation.

VI. EXPERIMENTAL RESULTS

The recognition rate of traffic light images on the basis of color of the projected system is shown in the table given below. The TPR rate of red light detected images of proposed system is 85.71 and FPR is 14.28 a percent and The TPR rate of green

light detected images of proposed system is 90.90 and FPR is 9.09 a percent The TPR rate of orange light detected images of proposed system is 83.33 and FPR is 16.66 a percent.

$$TPR= [TP/ (TP+FN)]*100 \ldots\ldots (4)$$

Where TP images successfully detected
Where FN images are not identified

$$FPR= [FP/ (FP+TN)]*100 \ldots\ldots (5)$$

Where FP images falsely detected

TABLE 1

(EXPERIMENTAL RESULTS)

Traffic images	Red traffic light images	Green traffic light images	Orange traffic light images
No. Of image	30	40	25
TPR	85.71	90.90	83.33
FPR	14.28	9.09	16.66

Fig: Input image

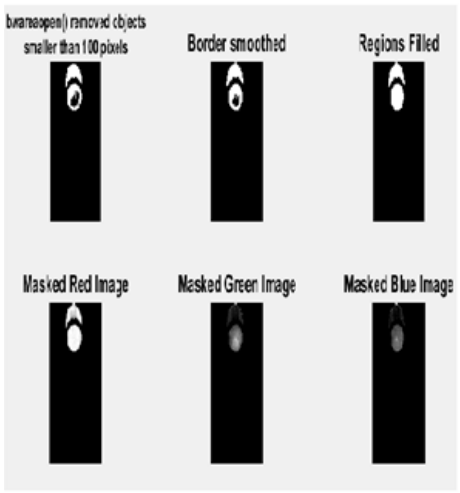

Fig: Preprocessing

Fig: Output image

V. CONCLUSION

With the projected system, if developed with more correctness, the blind citizens will able to go from one place to a new place without others help. If such a scheme is developed, it will act as a platform for the production of much more features later. The developed example gives good result in detecting moving vehicles on the road and traffic signal and intimating the user in the form of audio commands.

ACKNOWLEDGMENT

With huge joy, we are publishing this paper as a part of the syllabus of M.E. Computer Engineering. It gives us proud opportunity to total this paper effort under the precious leadership of Principal for given that all amenities and help for level development of paper work. We would also like to express thanks all the Staff Members of Computer Engineering Department, Management, friends, Who have directly or indirectly guided and helped us for the guidance of this paper and gives us an endless sustain right from the step the idea was conceive.

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