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Improving Functional Synchronization and Density Based Traffic Signal Management

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Abstract- The project is designed to develop a density and synchronized based dynamic system .The signal timing changes automatically on sensing the traffic density at the junction. The traffic congestion is a severe problem in many cities across the world. Current traffic signal light system is based on fixed time concept allocated on the each side of the junction which cannot be varied as per the varying traffic density at the junction .The image captured by the camera in the traffic signal is processed and converted into grey scale image .Then the threshold of the image is calculated based on which the contour is drawn in order to calculate the number of vehicles. We will come to know which side the density is high. Based on this we are able to allocate the time for each junction using fuzzy logic and synchronize multiple junctions in the network based on the traffic density.

I. INTRODUCTION

From the start of industrial revolution era mankind has been facing numerous problems relating to increase in population density especially in cities. One of the main problem arising due to increase in population is traffic congestion which is becoming more serious day after day. Multiple solutions have been supplied for reducing the problem arising due to traffic jam. These solutions have been able to reduce the problem arising due to traffic jam up to a certain extent but an everlasting solution has not been achieved in this matter. In this research we try to provide a novel method for controlling the flow of traffic and thereby reduce the problem caused due to increase in traffic.

Due to the massive growth in urbanization and traffic congestion, intelligent vision based traffic light controller is needed to reduce the traffic delay and travel time especially in developing countries as the current automatic time based control is not realistic while sensor based traffic light controller is not reliable in developing countries Traffic problems will be also much more widely increasing as an expected result of the growing number of transportation means and current low-quality infrastructure of the roads. In addition, many studies and statistics were generated in developing countries that proved that most of the road accidents are because of the very narrow roads and because of the destructive increase in the transportation means. This idea of controlling the traffic light efficiently in real time has attracted many researchers to work in this field with the goal of creating automatic tool that can estimate the traffic congestion and based on this Variable, the traffic sign time interval is forecasted.

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MOTIVATION

The traffic lights that are in widespread use today do not do much intricate reasoning when deciding when to change the lights for the various road users waiting indifferent lanes.

How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic. In Case the structure of the traffic.

II.PROBLEM DEFINITION AND LIMITATION

Researchers now are so much interested in automatic real-time traffic congestion estimation tool as it is the most significant factor on which intelligent transportation systems are based. Some of the researchers have focused in their work on traffic flow estimation.

It is measured as the rate at which vehicles pass a fixed point(e.g. vehicles per minute). They used spot sensors such as loop detectors and pneumatic sensors to quantify the traffic flow However; the sensors are very expensive and need a lot of maintenance especially in developing countries because of the road ground de-formations.

In addition, metal barriers near the road might prevent effective detection using radar sensors. It is also found that traffic congestion also occurred while using the electronic sensors for controlling the traffic. In contrast, video based systems are much better compared to all other techniques as they provide more traffic information and they are much more scalable with the progress in image progressing techniques. This is the main reason for the motivation to develop vision based tool for traffic light control in this work. In recent years, vision based traffic light control, which is based on video processing for traffic flow or traffic density estimation, has attracted that tension of many researchers.

The value of traffic density measures only the ratio between the density of the vehicles and the total density of the road. So based on this measure, the traffic control system will compare between different roads in the intersection to take the decision for the traffic light and the time interval given. However, most of the previous vision based monitoring systems suffered from lack of robustness on dealing with continuously changing environment such as lighting conditions, weather conditions and unattended vehicles.

All these mentioned factors considerably affect the traffic1density estimation. Changes in lightening conditions and weather conditions have been tackled in many of the previous approaches and they are going to be considered also in our proposed approach, but the problem that has never been addressed before and has a significant effecton the traffic pace is the stationary vehicles, specially the unattended ones.

The problem with the traffic density measurement is that the traffic density of a road with stationary or unattended vehicles is the same as the traffic density of a road with no stationary vehicles. Traffic flow counts the number of vehicles that passes through the frame during a certain time interval. However, it may give an empty road a higher priority than a congested road, because fewer vehicles are passing though the given point in that empty road. Therefore, we will concentrate on the detection of the delayed and unattended vehicles in the proposed approach for computing more informative metric about the traffic congestion in order to have more effective way of traffic.

This metric is very similar to the traffic density, but with taking the traffic flow into consideration. So it can be considered as a combination of both traffic density and traffic flow.

1.1 Architecture For The Control System

In this architecture camera is placed on the top of the signal to get the clear view of traffic on the particular side of the signal so that it will capture the image and analyze the traffic in that particular side and get the count of the number of vehicle. With this count the density of that particular side will be determined and corresponding signal will be provided.

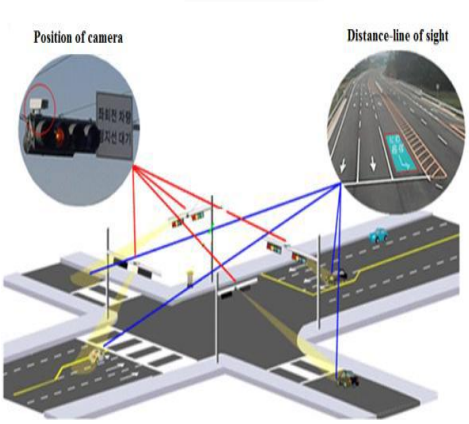

Fig. 1.1 System Architecture

1.2 DENSITY MEASUREMENT

Based on the different vehicle count, the microcontroller defines the ranges for traffic light delays and update those accordingly.

1.2.1 Source Image

In this system the source image is the RGB image which can be given by the
users for getting the contour image and the vehicle count in output screen.

The following code can be used to auto size of the output screen.

Fig.1.2.4 Canny Image

Fig. 1.2.1 Source image

1.2.2 Gray scale Image

The gray scale image can be used to display the objects in the format of black and white. In this system the output will be display the gray scale image after getting the source image only, because source image only converted into the gray scale image.

Fig 1.2.2 Gray Scale Image

1.2.3 Threshold Image

The threshold image brightness or contrast of the gray scale image. In this system we can convert the gray scale image to threshold image.

Fig 1.2.3 Threshold image

1.2.4 Canny Image

Canny image is the image one of the edge detector that can be used to outline the edges of the objects. It can be help full for find out the objects. Here we have convert the threshold image to canny image.

This figure shows the canny image of the vehicle present in the signaling area.

Erode image

The Erode image also like the canny image it can be used find the edges with the darken lines. In our system the edges of the vehicles are detect with the darker lines before converting the canny image to Erode image, the canny image will be destroyed.

Fig. 1.2.5 Erode Image

1.2.5 Contour Image

Before showing the vehicles count and output screen the Erode Image converted into the contour image. This image is the final step to find the vehicle counts and output screen. This image shows the contour image of the vehicle present in the signaling area.

Fig. 1.2.6 Contour Image

FUTURE ENHANCEMENT

1) This project can be enhanced in such a way as to control automatically the Signals depending on the traffic density on the roads using sensors like IR Detector or receiver module extended with automatic turn off when no vehicles are Running on any side of the road which helps in power consumption saving.

2) Traffic lights can be increased to Number and traffic light control can be done for whole city by sitting on a single place.

3) In ambulance system, the data of the patient in the ambulance can be sent to the Hospitals via GSM technology. Thus, it can provide early and fast treatment of the patient.

CONCLUSION

This project has been successfully presented a functional microcontroller and image based processing traffic light system for road intersection control. The traffic light system is designed by using microcontroller (AT89C51), power section, crystal oscillator and light emitting diode (LED). Then, for effective traffic control, the Atmel controller is implemented via an IC programmer using a program written in Basic language. The developed traffic light control system is tested by constructing a prototype that resembles the real application. The functionality of the prototype shows that the developed system can be used for a real life traffic control at road intersection. Also, developed system can be employed as a training kit in learning traffic light control system.

According to the density of vehicle the microcontroller allocate the time for each junction .Using fuzzy logic the multiple signal lights in a network is synchronized.

REFERENCE

1) Ashwini Y. Dakhole, Mrunalini P. Moon (2013**)** "Design of Intelligent Traffic Control System Based on ARM ",International Journal of Advance Research in Computer Science and Management Studies, ISSN: 2321-7782, Volume 1, Issue 6.

2) Dinesh Rotake, Prof. Swapnili Karmore (2012) "Intelligent Traffic Signal Control System Using Embedded System" Innovative Systems Design and Engineering ISSN 2222-1727 (Paper) Vol 3, No 5.

3) Ganiyu R.A, Arulogun O.T, Okediran O (2014) "Microcontroller Based Traffic Light System for Road Intersection Control", International Journal of Scientific & Technology Research Volume 3, Issue 5, ISSN 2277-8616.

4) Zhen Zhang, Functional Density Synchronization (2010), Department of Statistics, One Shields Ave., University of California, Davis, CA 95616, USA.