Image Processing Based Real Time Traffic Surveillance Using Raspberry pi

D.Pavani[1], S.Tulasi[2], R.Madhuri[3], T.Hemanth[4], P.Nagababu[5]
B.Tech[1:4], Assistant Professor[5] Computer Science Engineering, Tirumala Engineering College

Abstract: Nowadays congestion in traffic is a serious issue. The traffic congestion can also be caused by large red light delays etc. The delay of respective light is hard coded in the traffic light and it is not dependent on traffic. In this paper we studied the optimization of traffic light controller in a city using microcontroller. The system tries to reduce possibilities of traffic jams, caused by traffic lights, to an extent. The system is based on raspberry-pi and to make traffic light controllers more intelligent, the emergence of novel technologies such as communication networks and image processing is being exploited. Regulation of the traffic demand at each intersection in the network is the key feature involved in this method. The goal is to avoid traffic conflicts and shorten the length of the queue at a stop line. The system will measure the traffic density at different signals and accordingly change the time delays for traffic lights. The side at which the traffic is high, the signal will remain green for more time. The proposed system controls the traffic light by image processing using raspberry pi module. A camera has to be installed alongside the traffic light. It captures image sequences. The image sequence is then analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road, traffic light is controlled.

Keywords: *Raspberry pi, Open CV, Traffic Indication.*

I. INTRODUCTION

India is a big country and around the world India is second populous country and fast growing economy, In today's life we have to face different kinds of problem one of which is increasing amount of vehicles it becomes increase in traffic and chaos. Infrastructure growth in India and growth in number of vehicles is not equal, because of large population speed of increase in no of vehicles is much faster than infrastructure growth. Roads capacity and interaction along the roads (cross-roads / junctions) are not capable to handle higher number of vehicles. Major drawback of Indian traffic is non-lane based and chaotic. So for Indian traffic the solution system is required which is different from developed countries. The paper is grouped into different part. We discuss each part one by one for better understanding. mining technique. The important aspect about the contract will be extracted. The only relevant aspects will be displayed to one or many acceptor, who will then decide whether to make an approach for the contract or not.

II. LITERATURE SURVEY

India is the second most populous Country in the World is a fast growing economy. It is seeing increased no of road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Some time it will be not provide sufficient time to pass vehicles because traffic signal time is pre define. Nowadays traffic problem are increasing because of the increasing number of vehicles and the limited resources provided by the current infrastructures. Due to this, there is a need to wait more time in front of the signals. We propose a system for controlling the traffic light by image processing. The system will detect vehicles through capture camera images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light. It will capture image sequences. The image sequence will then be analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road traffic light can be controlled.

III. SYSTEM ARCHITECTURE

The existing system is based on the "time" which is already assigned in the system. According to these "time" the signals are working in each lane. But in these system condition is occurs as all vehicles in lane(L1) are passed and vehicles in another lane (L2) still in waiting state because time is not over and hence signal is still red. These systems are very inefficient because they are unable to handle various simple situations which are occurs throughout the day. Major drawback is it has unnecessary waiting time. We propose a smart traffic signal controller system. The proposed system tries to minimize the possibilities of traffic jams, caused by the traffic lights, to some extent by clearing the road with higher density of vehicles. Through which less number of vehicles in waiting state and can reduce time consuming. The system is based on the Raspberry pi micro controller technology. Complete system of Automotive traffic control System Separated in Following Seven Stages:

1. Image Acquisition
2. Image Pre-Processing
3. Morphological Processing
4. Blob Analysis

5. Count Density (No of Vehicles)
6. Find vehicle Emergency or Not
7. Send Signal.

Image Acquisition: Image of the vehicle is captured using video camera and transferred to the image processing system in Open CV.
Pre-processing: Acquired image is enhanced using contrast and brightness enhancement techniques.
Greyscale conversion: It involves conversion of colour image into a gray image. The method is based on different colour transform. According to the R, G, B value in the image, it calculates the value of gray value, and obtains the gray image at the same time.
Image Binarization: Greyscale image is converted into black and white image i.e. binary image using thresholding operation.
Traffic Density Calculation:- By applying Morphological filtering, and Blob analysis on the binary image number of vehicles will be count and compare with Traffic density threshold.

Raspberry Pi

A Raspberry Pi is a thirty five dollar, credit card sized computer board which when plugged into an LCD and attachment of a keyboard and a mouse, it is able to complete the functions of any regular PC can. Like a PC, it has RAM, Hard Drive (SD Card), Audio and Video ports, USB port,HDMI port, and Ethernet port. With the Pi, users can create spread sheets, word-processing, browse the internet, play high definition video and much more. It was designed to be a cost friendly computer for users who needed one. There are two models, Model A,B and 3. Model 3 is the faster containing 1GB of RAM as well as the ability to over clock.

IV. PROPOSED SYSTEM

A) Camera: if any vehicle detected captured image .

B) Read Image: Take one frame per second from video using image processing.

C) Image Subtraction: In system we already save background image without vehicles (Initial Condition) and subtracts current image of traffic from background image.

D) Convert Image to Binary:

- Creates black and white image.
- Vehicle=White. Background= Black

E) Morphological Processing:

- It Performs Image Filtering. Uses 2 processes - Open: Remove White dots other than vehicle. Close: Remove Black dots other than back ground.

F) Blob Analysis:-

a. Checks current density of vehicle.

b. Checks tags on vehicle if any.

G) Signal Controlling:-

Count number of vehicles and generates Greater density lane = green signal , and Other lane = Red.

Open CV

Open CV Stands for Open Computer Vision it is source library of functions. Open CV is released under a BSD license hence it is free for both Academic and Commercial used It is open source library written in C/C++.Open CV support many languages like C, Perl, Ruby. It is originally developed by Intel. Mainly aim at real-time computer vision It is a cross-platform (Linux, OS X, Win2K, Win XP).

Raspbian OS

Raspbian is free OS based on debian optimized for the raspberry device an operating system is the set of basic programs and utility that make your Raspberry pi run. Raspbian provides more than a pure OS it's comes with over 35000 packages, precompiled software bounded in easy format of installation on your Raspberry pi device.

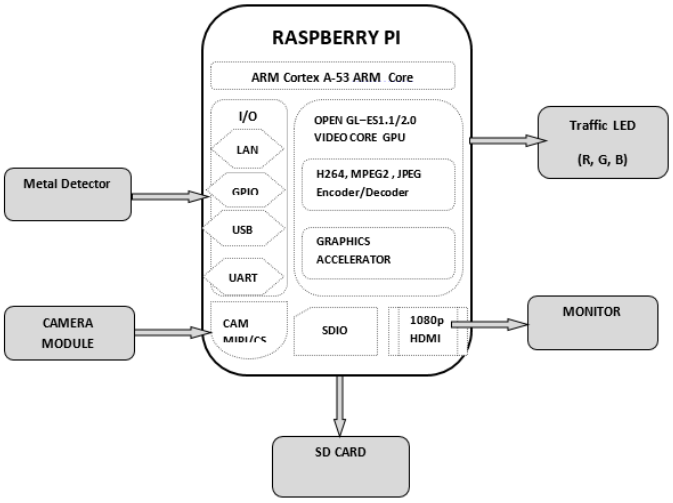

Fig.1: System Architecture for Traffic Control

V. RESULTS

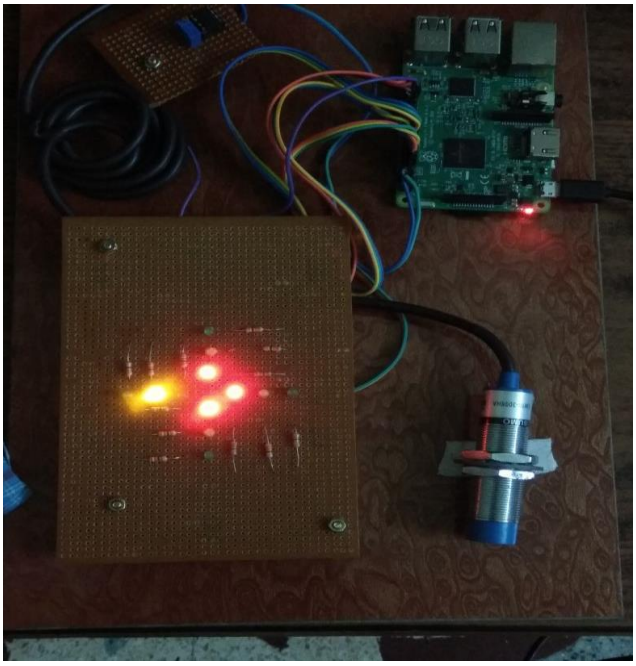

Fig.2: Hardware Design

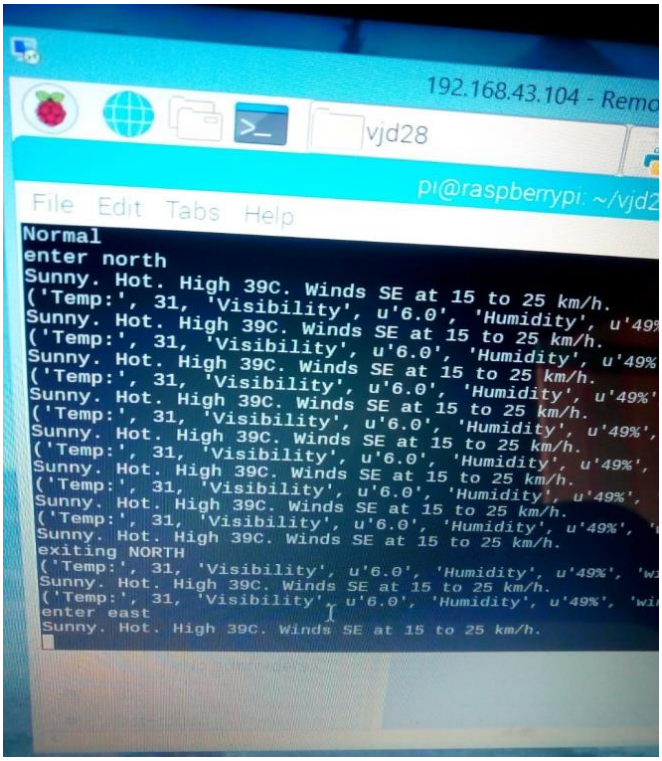

Fig.3: Traffic Analysation

VI. CONCLUSION

This proposed system reduces the possibilities of traffic jams, caused by high red light delays. Here we designed the system with the purpose to clear the traffic in accordance with priority. In this system, we find the traffic density using Morphological filtering, and Blob analysis. The road with the highest priority is cleared first. A microcontroller, Raspberry pi was used to control the traffic signal. The road density data of four roads was sent to Raspberry pi and corresponding road signal with highest road density signals green colour. The accuracy of vehicle detection depends on the weather conditions.

To realize the dream of developed India, we must have smart cities. To have smart cities, a smart commuting system must be implemented. We look forward to develop and implement this in the near future. The future scope of this project lies in successful implementation of real time control system with the help of guidance from public transport authorities. System accuracy is possible to be improved by further training or other modification on the algorithm.

VII. REFERENCES

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