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Traffic Control System Using Pi Camera

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ABSTRACT: The current Traffic control framework is in view of the "time" which is as of now allotted in the framework. As indicated by these occasions the signs are working in every path. In any case, in these framework condition is happens as all vehicles in path (L1) are passed and vehicles in another path (L2) still in holding up state since time isn't finished and henceforth flag is as yet red. These frameworks are extremely wasteful on the grounds that they are helpless to deal with different straightforward circumstances which are happens for the duration of the day. Significant downside is it has pointless holding up time and there is no office to handle crisis vehicles. The venture is intended to build up a framework which performs execution dependent on thickness of vehicles (Vehicle Check). Subsequent to figuring the quantity of vehicles we will come to know in which side the thickness is high founded on which signs will be allocated for a specific side. Raspberry-Pi is utilized as a microcontroller which gives the flag timing dependent on the traffic thickness. Furthermore, can give office to deal with crisis vehicles consequently and effectively.

KEYWORDS: Raspberry-PI, Traffic Management, Image Processing, Open CV

I. INTRODUCTION

Traffic-jam is a very big problem in developing cities, In fact it's ever increasing day-by-day nature makes it difficult to find where the traffic density is more in real time, so that to schedule a better traffic signal control and effective traffic routing. The root cause of this can be of different situations like congestion in traffic like insufficient Road width, Road conditions due to weather, unrestrained demand, large delay of Red Light etc. While insufficient capacity and unrestrained demand are somewhere interrelated, the delay of respective light is hard coded and not dependent on traffic. Indeed, manual control is must, Therefore, in order to reduce man's power, the need for simulating and optimizing traffic control to satisfy the increasing demand arises. Technology in the recent past using image processing for surveillance and safety, which is widely used in vehicle and traffic management for traveler information. The traffic density estimation can also be achieved using Image Processing.

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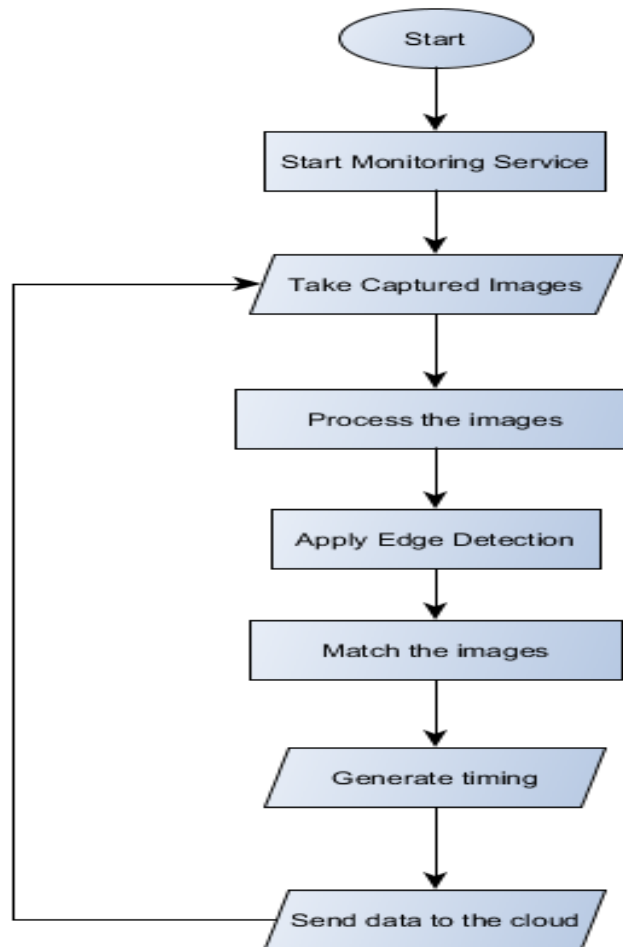


Fig.1 Model – A Flow of Work

A. Solution to the Problem

We propose a technique that can be used for traffic control using image processing. According to the traffic densities on all roads, our model will allocate smartly the time period of green light for each road. We have chosen image processing for calculation of traffic density as cameras are very much cheaper than other devices such as sensors. The proposed model is constructed as follows: We have a Raspberry Pi that is connected to 4 sets of LED that represent the traffic lights. It is the process of monitoring the traffic density of each side and change the signal according to the density in every direction.

B. Existing System

India is a substantial nation and around the globe India is second most crowded nation and quickly developing economy, In the present life we need to confront unique sorts of issue one of which is expanding measure of vehicles it moves toward becoming increment in rush hour gridlock and tumult. Framework development in India and development in number of vehicles isn't equivalent, as a result of expansive populace speed of increment in no of

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vehicles is a lot quicker than foundation development. Streets limit and cooperation along the streets (cross-streets/intersections) are not fit to deal with higher number of vehicles. Real disadvantage of Indian traffic is non-path based and disorganized. So for Indian traffic the arrangement framework is required which is not the same as created nations. The system is gathered into various parts. We talk about each section one by one for better understanding. The essential viewpoint about the contract will be extricated. The main important viewpoints will be shown to one or numerous acceptor, who will at that point choose whether to make a methodology for the contract or not.

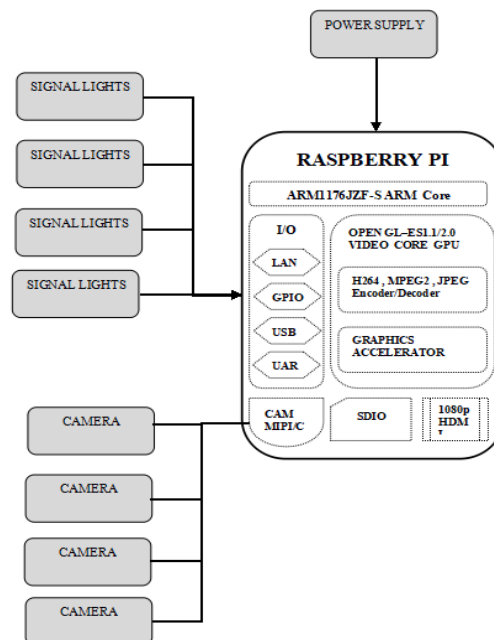


Fig.2 Proposed System Block Diagram

C. Proposed System

The current framework depends on the "time" which is now relegated in the framework. As indicated by these "time" the signs are working in every path. In any case, in these framework condition is happens as all vehicles in path (L1) are passed and vehicles in another path (L2) still in holding up state since time isn't finished and henceforth flag is as yet red. These frameworks are extremely wasteful in light of the fact that they can't deal with different basic circumstances which are happens for the duration of the day. Significant disadvantage is it has pointless holding up time. We propose a savvy traffic flag controller framework. The proposed framework attempts to limit the conceivable outcomes of car influxes, brought about by the traffic lights, to some degree by clearing the street with higher thickness of vehicles. Through which less number of vehicles in holding up state and can diminish tedious. What's more, our framework additionally gives the freedom to the crisis vehicle assuming any. For instance fire crisis, rescue vehicle crisis and VIP people vehicles. The framework depends on the AVR small scale controller innovation. The code for this task is assembled in cutting edge C compiler and the reproduced with Proteus programming. Complete arrangement of Automotive traffic control System Separated in Following Seven Stages:

- (an) Image Acquisition
- (b) Image Pre-Processing
- (c) Morphological Processing
- (d) Blob Analysis
- (e) Count Density (No of Vehicles)

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- (f) Find vehicle Emergency or Not
- (g) Send Signal.

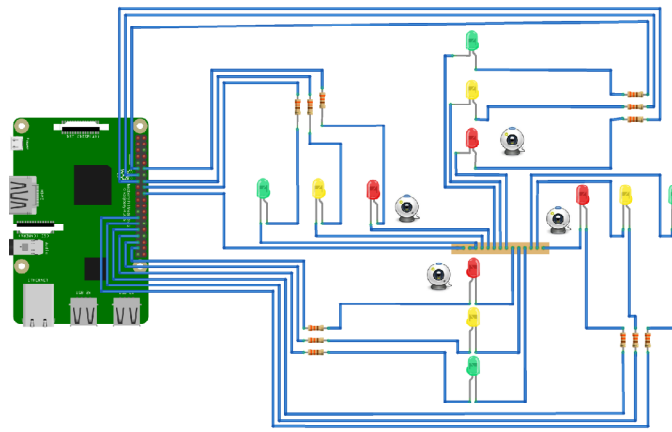


Fig.3 Circuit Diagram Model

D. System Implementations

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.

Identify Ambulance: By using Binary image, Morphological filtering, and Blob analysis ambulance will be detected.

Send ambulance signal to the microcontroller: The identified ambulance is send to AVR microcontroller through serial port.

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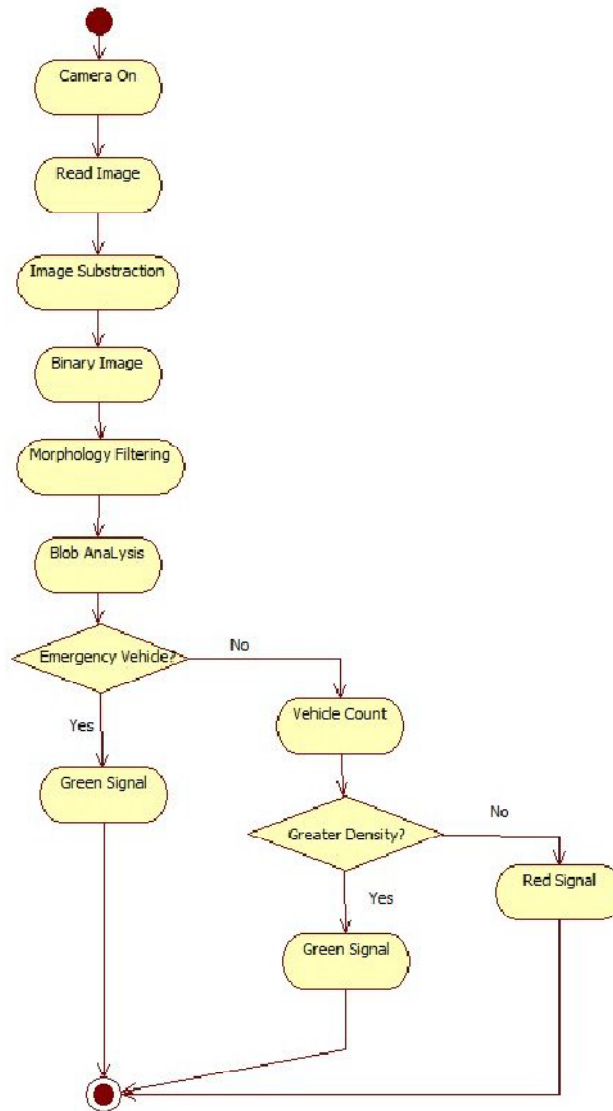


Fig.4 Proposed System Flow Diagram

III. LITERATURE SURVEY

Density Based Traffic Signal System - K.Vidhya, A.Bazila Banu - 2014 [1] At the present time, the traffic control system becomes the main issue because of the fast increase in automobiles and also due to large time delays between traffic lights. So, in order to overcome this problem, we will go for density based traffic light timing control system. This article discusses how to control the traffic based on density. The proposed system uses IR sensors to calculate the traffic density. We have to place one IR sensor on every road; where the sensor always senses the traffic on that specific road. All these sensors are interfaced to the microcontroller. Based on the sensors, microcontroller detects the traffic and controls the traffic system. The aim of the traffic control system project is to solve traffic congestion, To solve the problem, we have designed a framework for a dynamic and automatic traffic light control system and

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developed a simulation model with codes to help to build the system on hardware. It is possible to propose dynamic time-based coordination schemes where the green signal time of the traffic lights is assigned based on the present conditions of traffic. This is achieved by using 3 pairs of IR sensors (Transmitter and Receiver) across the road to monitor a particular length/zone while vehicles on the same zone block the IR light falling on the IR receiver to assume low traffic density. As there are 3 zones only, it is immaterial if vehicles are parked side by side. As it crosses the zone, the green time automatically changes as programmed.

A Technique on Road Tranc Analysis using Image Processing - Priyanka Khanke, Prof. P. S. Kulkarni - 2014 [2]

A methodology using image processing to detect vehicles on highways is presented in this paper. Vehicle detection is done in two stages. In stage one, the dimensional and morphological study of the analyzed highway is carried out in order to model and calibrate the vision system. In stage two, vehicles are detected owing to the method of matching clear and dark blobs. These are extracted by mathematical morphology techniques and bright headlight images by using pattern recognition techniques. The position of the vehicle allows access to spatial-temporal information which characterizes traffic flow and permit automatic traffic control.

Implementing intelligent Traffic Control System for Congestion Control - Rajeshwari Sundar, Santhosh Hebbar and Varaprasad Golla - 2015 [3]

This paper presents an intelligent traffic control system to pass emergency vehicles smoothly. Each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. We use RFID reader, NSK EDK-125-TTL, and PIC16F877A system-on-chip to read the RFID tags attached to the vehicle. It counts number of vehicles that passes on a particular path during a specified duration. It also determines the network congestion, and hence the green light duration for that path. If the RFID-tag-read belongs to the stolen vehicle, then a message is sent using GSM SIM300 to the police control room. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light. This module uses ZigBee modules on CC2500 and PIC16F877A system-on-chip for wireless communications between the ambulance and traffic controller. The prototype was tested under different combinations of inputs in our wireless communication laboratory and experimental results were found as expected.

Real Time Traffic Light Control Using Image Processing - Ms.Pallavi Choudekar, Ms.Sayanti Banerjee and Prof.M.K.Muju – 2012 [4]

As the problem of urban traffic congestion spreads, there is a pressing need for the introduction of advanced technology and equipment to improve the state-of-the-art of traffic control. Traffic problems nowadays are increasing because of the growing number of vehicles and the limited resources provided by current infrastructures. The simplest way for controlling a traffic light uses timer for each phase. Another way is to use electronic sensors in order to detect vehicles, and produce signal that cycles. We propose a system for controlling the traffic light by image processing. The system will detect vehicles through images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light. It will capture image sequences. Setting image of an empty road as reference image, the captured images are sequentially matched using image matching. For this purpose edge detection has been carried out using Prewitt edge detection operator and according to percentage of matching traffic light durations can be controlled.

Intelligent Traffic Signal Control System - R.Nithin Goutham¹, J. Sharon Roza² and M.Santhosh – 2014 [5]

Present Traffic Light Controllers (TLC) are based on microcontroller and microprocessor. These TLC have limitations because it uses the pre-defined hardware, which is functioning according to the program that does not have the flexibility of modification on real time basis. Due to the fixed time intervals of green, orange and red signals the waiting time is more and car uses more fuel. To make traffic light controlling more efficient, we exploit the emergence of new technique called as "Intelligent traffic light controller". This makes the use of Sensor Networks along with Embedded Technology. The timings of Red, Green lights at each crossing of road will be intelligently decided based on the total traffic on all adjacent roads. Thus, optimization of traffic light switching increases road capacity and traffic flow, and can prevent traffic congestions. GSM cell phone interface is also provided for users those who wish to obtain the latest position of traffic on congested roads. This is a unique feature of this project which is very useful to car

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drivers to take an alternate route in case of congestion. The various performance evaluation criteria are average waiting time, average distance traveled by vehicles, switching frequency of green light at a junction, efficient emergency mode operation and satisfactory operation of SMS using GSM Mobile. The performance of the Intelligent Traffic Light Controller is compared with the Fixed Mode Traffic Light Controller. It is observed that the proposed Intelligent Traffic Light Controller is more efficient than the conventional controller in respect of less waiting time, more distance traveled by average vehicles and efficient operation during emergency mode and GSM interface. Moreover, the designed system has simple architecture, fast response time, user friendliness and scope for further expansion.

IV. CONCLUSION

This proposed framework lessens the conceivable outcomes of traffic jams, brought about by high red light postponements and gives the leeway to the crisis vehicle, to a degree and effectively. Here we structured the framework with the reason to clear the traffic as per need. In this framework, we discover the traffic thickness utilizing Morphological separating, and Blob examination. The street with the most elevated need is cleared first. The proposed framework additionally offers significance to the emergency vehicle. Assuming any emergency vehicle is holding up in a flag then the specific path is given a higher need and the traffic in that path is cleared. Crisis vehicle is identified by utilizing picture preparing. At whatever point the crisis vehicle enters the path, by utilizing camera picture, Morphological sifting what's more, mass examination distinguishes vehicle and sends it to small scale controller. Miniaturized scale controller gives the high need to the path with the crisis vehicle and clears that specific path.

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