TRAFFIC DENSITY DETECTION WITH VEHICLE IDENTIFICATION FOR SMART TRAFFIC MONITORING

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Abstract: In today’s generation of twenty first century, we have to face several issues a well-known of that is traffic jam becoming a lot of serious day by day. The traffic congestion can also be caused by large Red light de-lays, etc. This paper is about optimization of Image processing based traffic light controller in a City using raspberry pi microcontroller. The system tries to reduce possibilities of traffic jams, caused by traffic lights, to an extent. The micro-controller used in the system is Raspberry pie. One camera is placed on respective road and capture images to analyze traffic density. Then according to density priorities of traffic light signals are decided. The system contains three LEDs which are mounted on the one side of road. According to this project if traffic density is higher the traffic signals automatically stop the signals and give green signal for this vehicles. Here traffic density is detected using image processing. Canny edge detection is used to detect the edges of an object and according to the no objects traffic density can be detected.

Keywords: traffic density, image processing, raspberry pi, led, etc.

INTRODUCTION:

In an old automatic traffic controlling a traffic light uses timer for every phase. Using electronic sensors is another way in order to detect vehicles, and produce signal that to this method the time is being wasted by a green light on an empty road. Traffic congestion also occurred while using the electronic sensors for controlling the traffic. All these drawbacks are supposed to be eliminated by using image processing. We propose a system for controlling the traffic light by image processing. The vehicles are detected by the system through images instead of using electronic sensors embedded in the pavement. A camera will be placed alongside the traffic light. It will capture image sequences. Image processing is a better technique to control the state change of the traffic light. It shows that it can decrease the traffic congestion and avoids the time being wasted by a green light on an empty road. It is also more reliable in estimating vehicle presence because it uses actual traffic images. It visualizes the practicality, so it functions much better than those systems that rely on the detection of the vehicles’ metal content. Image Processing is a technique to enhance raw images received from cameras/sensors placed on space probes, aircrafts and satellites or
pictures taken in normal day-to-day life for various applications. An Image is rectangular graphical object. Image processing involves issues related to image representation, compression.

Techniques and various complex operations, which can be carried out on the image data. The operations that come under image processing are image enhancement operations such as sharpening, blurring, brightening, edge enhancement etc. Image processing is any form of signal processing for which the input is an image, such as photographs or frames of video; the output of image processing can be either an image or a set of characteristics or parameters related to the image. Most image processing techniques involve treating the image as a two-dimensional signal and applying standard signal processing techniques to it. Image processing usually refers to digital image processing, but optical and analog image processing are also possible. Many techniques have been developed in Image Processing during the last four to five decades. Most of the methods are developed for enhancing images obtained from unmanned space probes, spacecraft and military reconnaissance flights. Image Processing systems are becoming widely popular due to easy availability of powerful personnel computers, large memory devices, graphics software and many more. Image processing involves issues related to image representation, compression techniques and various complex operations, which can be carried out on the image data. The operations that come under image processing are image enhancement operations such as sharpening, blurring and brightening, edge enhancement. Traffic density of lanes is calculated using image processing which is done of images of lanes that are captured using digital camera. We have chosen image processing for calculation of traffic density as cameras are very much cheaper than other devises such as sensors. Making use of the above mentioned virtues of image processing we propose a technique that can be used for traffic control. Here the traffic density is detected according to the number of objects detected and the threshold value. If threshold value is defined to be $n$ and the number of vehicles detected are greater than $n$ then it is considered as traffic density is high or else traffic density is less. Now the threshold value can be set according to our requirement. Threshold value is a static value and it is a developer dependent.

LITERATURE SURVEY:

Highway traffic density control based on the composite of CACMAC and PID controller

Xinrong Liang ; Jiexia Fu ; Mu Yan ; Xinrong Liang

Published in: 2017 Chinese Automation Congress (CAC)

In this paper, a composite control method based on credit assignment cerebellar model articulation controller (CACMAC) and proportional-integral-derivative (PID) controller is applied to highway density control. Firstly, a macroscopic traffic model is established to describe the evolution process of highway traffic flow accurately. Secondly, the principle and algorithm of CACMAC-PID compound control are studied in detail. Thirdly, road density controllers based on CACMAC-PID compound control are designed by combining the highway traffic model and a nonlinear feedback technology.

A simulation study of traffic agent to identify traffic flow density using modified traffic cellular automaton model

Steven Ray Sentinuwo ; Kohei Arai
This paper presents the evaluation of traffic agent utilization to identify road traffic flow density. This research also proposes the concept of traffic agent as the new method for traffic monitoring and surveillance. Smart autonomous traffic light switching by traffic density measurement through sensors

Y M Jagadeesh; G. Merlin Suba; S Karthik; K Yokesh

Published in: 2015 International Conference on Computers, Communications, and Systems (ICCCS) This paper is concerned with the development and implementation of Sensor based Traffic Light System with Dynamic Control which in turn reduces the Average Trip Waiting Time (ATWT). It consists of IR sensors, Low Power embedded controllers, comparators and storage device. Comprehensive traffic management system: Real-time traffic data analysis using RFID B S Meghana; Santoshi Kumari; T P Pushphavathi

Published in: 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA) Comprehensive Traffic Management System (CTMS) using Radio Frequency Identification (RFID) and analytics for real time implementation has been proposed.

Traffic Light Controller Using Sound Sensors and Density Sensors R. R. Jegan; E. Sree Devi; M. Sindhuja; S. Pushna; D. Sudhaa

Published in: 2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT) we are using density sensor for measuring density of the vehicles and sound sensors to detect the sound signals of such vehicles. All these sensors are interfaced to the PIC micro controller to collect the data and provide priority to the congested lane.

PROPOSED SYSTEM:-

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FIG: TRAFFIC DENSITY DETECTION

Steps:
a) Images are rescaled to fixed resolution.
b) Then the above rescaled images are converted from RGB to gray.
c) Edge detection of pre-processed images is carried out using canny edge detection technique.
d) The output images of previous step are matched using pixel to pixel matching technique.

After matching the timing allocation is done depending on the count of the vehicles that are calculated.

1) First the signal is set to red
2) Then it is changed to yellow for 6 seconds
3) If the traffic density is higher than signal will immediately turn into green
4) If the number of vehicles counted is less than threshold value then red signal will get on. And so on

METHODODOLOGY:

The camera will capture the image, the captured image will undergo an image processing technique to detect number of objects in the image as below:

RGB TO GRAY Scale Conversion:

RGB to gray conversion is done on the progression of images. Now gamma correction is done on each of the captured gray image to achieve image enhancement.

IMAGE ENHANCEMENT:

The acquired image in RGB is first converted into gray. Now we want to bring our image in contrast to background so that the appropriate threshold level may be selected while binary conversion is carried out. This calls for image enhancement techniques. The objective of enhancement is to process an image so that result is more suitable than the original image for the specific application.

EDGE DETECTION:

Edge detection methods locate the pixels in the image that correspond to the Edge detection is a basic tool in image processing, machine vision and computer envisage, particularly in the areas of feature reveal and feature extraction. In our project we use “CANNY EDGE DETECTION TECHNIQUE” because of its various advantages over other edge detection techniques.

CANNY EDGE DETECTION:

The Canny Edge Detector is one of the most commonly used image processing tools detecting edges in a very robust manner. It is a multi-step process, which can be implemented on the GPU as a sequence of filters.

to describe the business and operational step by- step flows of components in a system. The UML diagrams of the applications are figured as follows:
Use Case Diagram:

Use Case Diagram. Example below It shows a set of use cases and actors (a special type of class and their relationship). Use case diagrams address the static use case view of the system. Such diagrams are particularly important in the arrangement and simulation of a system's actions.

![Use Case Diagram](image.png)

Conclusion:

It project provides an adaptive traffic control system based on image processing through the use of Raspberry pi that we will introduce using the PYTHON programming language. "Image Processing Based Intelligent Traffic Control using Raspberry Pi" technique we are proposing to overcome all the limitations of the previous (in-use) traffic control techniques. Later in the automated use of the clock for traffic control, there was a downside that the time wasted on the empty by green light. This approach is going to avoid all these problems.
REFERENCES:


