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An Implementation of Density Based Traffic Control System Using Image Processing

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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. The delay of respective light is hard coded and it is not dependent on actual density. Therefore for simulating and optimizing traffic control to better accommodate this increasing demand is arises. 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 system is based on image processing using python. The micro-controller used in the system is Raspberry pie. one camera is placed on respective road and capture images to analyse 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. These techniques are in brief delineated in next section. Here traffic density is detected using image processing , the algorithm used to detect vehicle is canny edge detection, 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, Arduino, LED, etc.

I. INTRODUCTION

In an old automatic traffic controlling a traffic light uses timer for every phase. Using electronic sensors is an other 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 daytoday 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 imageprocessing 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

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unmanned space probes, spacecrafts and military reconnaissance flights. Image Processing systems are becoming widely popular due to easy availability of powerful personnel computers, large memory devices, graphics softwares 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, 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.

II. RELATED WORK

An Image is rectangular graphical object. Image processing involves issues related to image representation, compressiontechniques 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 imageprocessing 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, spacecrafts and military reconnaissance flights. Image Processing systems are becoming widely popular due to easy availability of powerful personnel computers, large memory devices, graphics softwares 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, 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.

III. METHODOLOGY

OpenCV (Open Source Computer Vision Library) is used to filter images taken from either a video stream, video files or image files. While using a supported programming language, you can create a program to use a camera, as a sensor, to detect and track elements within an image. If you can isolate elements within an image, you can detect and track the elements within video streams.OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 18 million. The library is used extensively in companies, research groups and by governmental bodies.

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IV. PROPOSED SYSTEM

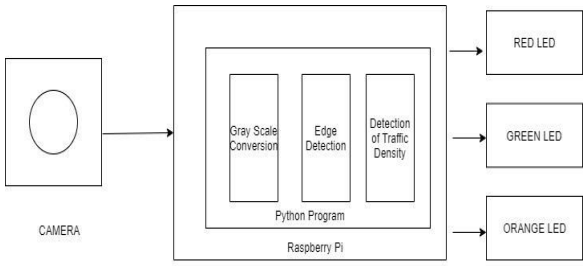

FIG: TRAFFIC DENSITY DETECTION

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

V. IMPLEMENTATION RESULTS

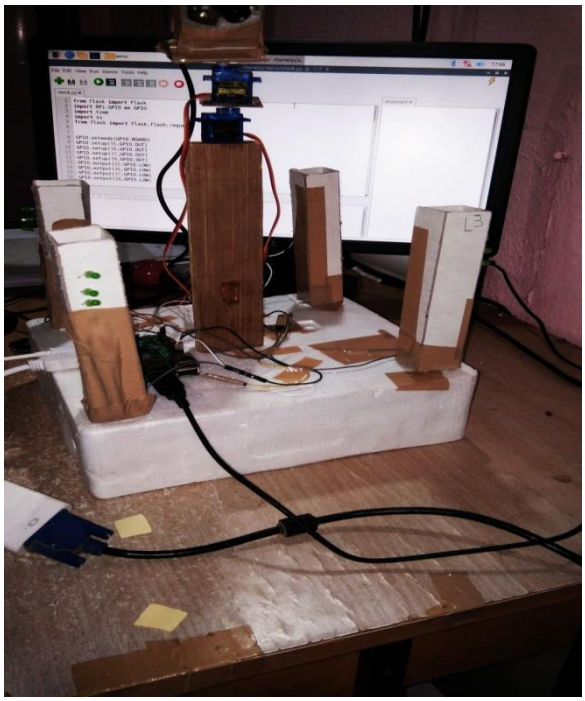

Fig: Hardware Implementation

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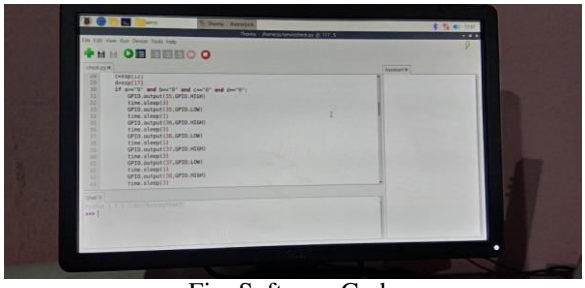

Fig: Software Code

VI. CONCLUSION

This project presents An Image Processing Based Intelligent Traffic Control System by using Raspberry pi which we are going to implement using PYTHON Programming Language. "Image Processing Based Intelligent Traffic control using Raspberry Pi" technique that we propose overcomes all the limitations of the earlier (in use) techniques used for controlling the traffic. Earlier in automatic traffic control use of timer had a drawback that the time is being wasted by green light on the empty. This technique will avoid all this problems.

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