

Implementation of Advance Adaptive Traffic Light Control System Using DIP and Embedded

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ABSTRACT: As we know the population of city and number of cars is increasing day by day. With increasing urban population and hence the number of cars, need of controlling streets, highways and roads is vital. In this paper, a system that estimates the size of traffic in highways by using image processing has been proposed and as a result a message is shown to inform the number of cars in highway. This project has been implemented by using the Matlab software and it aims to prevent heavy traffic in highways. Moreover, for implementing this project following steps must be considered: 1) image acquisition 2) RGB to grayscale transformation 3) image enhancement and 4) morphological operations. At first, film of highway is captured by a camera has been installed in highway. Then, the film comes in the form of consecutive frames and each frame is compared with the first frame. After that, the number of cars in highways is specified. At the end, if the number of cars is more than a threshold, a message is shown to inform the traffic status. By this message we can predict the need to reduce the size of traffic carried. Experiments show that the algorithm will work properly.

KEYWORDS: traffic analysis, image processing, motion vehicle tracking, filtration, morphological operation, gamma correction

I. INTRODUCTION

The number of vehicles on the road increases day by day therefore for the best utilization of existing road capacity, it is important to manage the traffic flow efficiently. Traffic congestion has become a serious issue especially in the modern cities. The main reason is the increase in the population of the large cities that subsequently raise vehicular travel, which creates congestion problem. Due to traffic congestions there is also an increasing cost of transportation because of wastage of time and extra fuel consumption. Traffic jams also create many other critical issues and problems which directly affect the human routine lives and sometime reason for life loss. For example, if there is an emergency vehicle like ambulance on the road with the critical patient on board. In that situation if an ambulance gets stuck in a heavy traffic jam then there are high chances that the patient cannot reach the hospital on time. So it is very important to design an intelligent traffic system which controls traffic intelligently to avoid accidents, collisions and traffic jams. The most common reason of traffic congestion in third world countries is an inefficient traffic signal controlling which affects the traffic flow. For example, if one lane has less traffic and the other lane with huge traffic but the duration of green light for both lanes is same then this is the waste of available resources and is inefficient. By considering the above example if the lane with higher traffic density should switch on the green signal light for a longer period than the lane with lesser density.

Most of the city traffic is controlled by sensors and cameras shall be installed in big highways and streets. But existence of a system for detecting the size of traffic automatically will be felt. Such systems can allow to extract information from the bigger traffic issue and helps us decide to improve the traffic policy. The paper aims to render automate control system for traffic on highways and streets.

The system using image processing has been implemented where upon it entailed the following results: 1) Density 2) Streets and roads in order to census counted three cars 3) monitor off roads 4) Detect the occurrence of accidents and violations occurred as well as motion detection car is a dangerous spiral. Scientists and other researchers suggested

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other different ways. Technically, this system is based on computers and cameras. The project components include: (A) hardware model (B) software model.

A) Hardware model:

Image sensors: In this project the images are captured by a USB web camera have been used. PC: a pc as a general purpose central unit for various image processing tasks has been used.

B) Software model: For our algorithm; software Matlab has been used. Some steps for implementing this algorithm are as follows: Receiving video via camera and convert video input to two images RGB to Grayscale conversion on received images image enhancement Morphological operations. The rest of the paper has been divided as follows: In Section 2 the main steps of suggested method is proposed. The gamma correction for image enhancement is discussed in Section 3. Section talks about the different types of vehicle tracking and operations. In Section morphological operation has been presented. Rest of the paper shows the suggested algorithm and flowchart in summary and Section deals with the results of experiments. There are lots of techniques proposed to design an intelligent traffic system, for example, fuzzy based controller and morphological edge detection technique are proposed in This technique is based on the measurement of the traffic density by correlating the live traffic image with a reference image. The higher the difference is higher traffic density is detected. In another technique is proposed to design an intelligent traffic system, which is based on four lane system in which time is allocated according to the number of vehicles on the lane. Automatic traffic monitoring and surveillance are important for road usage and management. Traffic parameter estimation has been an active research area for the development of intelligent Transportation systems (ITS). For ITS applications traffic- information needs to be collected and distributed. Various sensors have been employed to estimate traffic parameters for updating traffic information. In another technique is proposed to control the traffic signal by using image processing, in which they first selected the reference image which is the image with no vehicles or less vehicles and every time matching real time images with that reference image.

II. OBJECTIVE

1. Distinguish the presence and absence of vehicles in road images
2. Signal the traffic light to go red if the road is empty;
3. Signal the traffic light to go green in case of presence of traffic on the road and the duration of green light is adjusted according to the traffic
4. The proposed system is very cost effective as it does not require installation of any additional devices, such as RFIDs.

III. DESCRIPTION OF THE PROPOSED WORK

Our proposed method consists of two phases.

Phase 1:

First images are captured by camera. The first images of highway when there is no traffic will be taken. The first image of highway has been considered as a reference file and stored in a specific location in the program. RGB to Grayscale Conversion in order to achieve image enhancement is done. The density is done using MATLAB software which is installing in to pc.

Phase 2:

In First phase traffic density which is calculated in MATLAB software after signal transmitted to microcontroller using usb to ttl converter. According to intensity of traffic the time duration of traffic light calculated by microcontroller.

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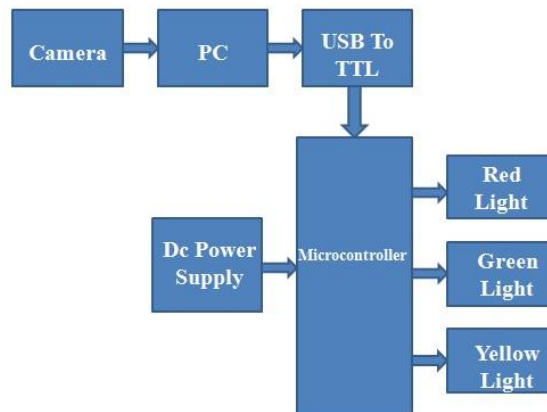


Fig: Block diagram of proposed system

IV. WORKING

The first images of highway when there is no traffic will be taken. The first image of highway has been considered as a reference file and stored in a specific location in the program. RGB to Grayscale Conversion in order to achieve image enhancement is done. The density is done using MATLAB software which is installing in to pc.

After the application opens, one has to initialize the port address of the USB to TTL module which will varies system to system but it should have the fixed baud rate as 9600 which has to be set at the extreme right top of the window opens at the start-up of the system. After selecting the baud rate and com port, press on the click button to start the working of the system.

In the window there are two boxes, from which, one of them is for reference image and other one is for the captured image. Reference image is compared with the captured image and from that comparison it defines the density of the traffic that is low, high or very high. In the figure 6.4, the density is shown as “Low” after comparing the two images and gives signal to the microcontroller based control system to adjust the time delay of that root for which the image is taken.

V. RESULTS

Setup of project is shown below which allow us to take the final results for this research work,

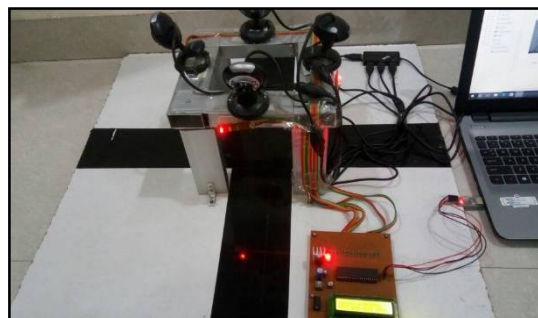


Fig: Project Setup

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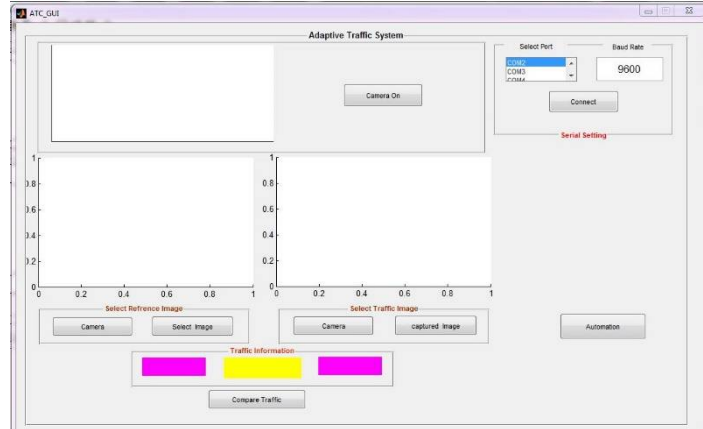


Fig: Software Window at Start-up

The Above picture is the snapshot of the window created in the MATLAB 12b Simulink Software.

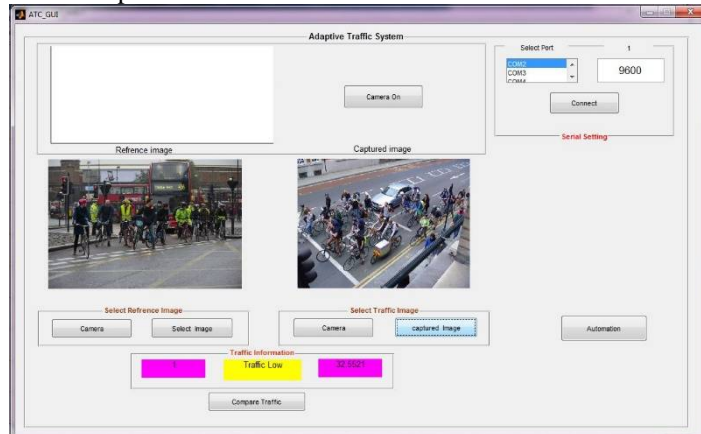


Fig: Result window

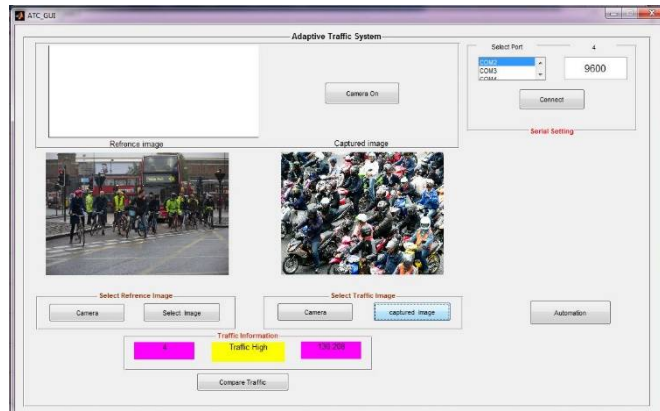


Fig: Result Window:

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Fig: Results On LCD

The results are fully satisfied and give completely correct results when compare with the conventional systems.

VI. CONCLUSIONS

A method for estimating the traffic using Image Processing is presented. This is done by using the camera images captured from the highway and videos taken are converted to the image sequences. Each image is processed separately and the number of cars has been counted. If the number of cars exceeds a specific threshold, warning of heavy traffic will be shown automatically. The advantages of this new method include such benefits as: 1) Non-use of sensors 2) Low cost and easy setup and relatively good accuracy and speed. Because this method has been implemented using Image Processing and Matlab software, production costs are low while achieving high speed and accuracy.

Extra hardware such as sound sensors or RFID tags can be eliminated. In this respect, the method is superior to previously published designs. The method presented in this paper is simple and there is no need to use sensors that have been commonly used to detect traffic in the past.

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