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Intelligent Traffic Control Using Image Processing

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Abstract: -

Nowadays, the number of road users constantly increases; vehicle population also increased to an extreme level. So the traffic problem causes major time delay and more issues. So, we are in need to find better solution for traffic control. There are several types of traffic control system; we focus on optimization of traffic light controller in a city using image processing. To overcome this problem, this proposed system contains camera and microcontroller to process image and measures density of traffic and the traffic controller changes signal timing automatically based on the traffic density at junction and the cameras are mounted on roadside respectively. This project is to design a density based dynamic traffic control system. The number of vehicles passing on road is get counted by microcontroller. The microcontroller takes decision based on different vehicles count, and updates the traffic light delays as a result. The traffic light is situated at a certain distance away from the camera system. In the proposed system, we measure the traffic density using image processing by MATLAB and ARM processor to control the traffic signal.

I. INTRODUCTION

As the number of vehicles in the cutting edge urban areas is expanding step by step because of which vehicular travel is expanding which prompt blockage issue. Traffic congestionhas been causing numerous basic issues and difficulties in the major and most populated urban areas. Because of this activity clog there is more wastage of time. The consistent increment in the quantity of vehicles out and about has increased the significance of overseeing traffic stream proficiently to upgrade use of existing street limit. High fuel cost and ecological concerns additionally give essential motivations to limiting traffic delays. Street accident is another principle issue in present day world. In the event that we watch genuinely the reasons for street accident, we found that thin streets and fast increment of methods for transport are the fundamental explanations for expanding number of street mishaps. Activity Rules and Laws, Road Signs and Traffic Control Systems are utilized to take care of the already said traffic issues. Activity laws are the laws which represent traffic and manage vehicles, while guidelines of the street are both the laws and the casual principles that may have created after some time to encourage the precise and auspicious flow of traffic. Traffic signs or street signs will be signs raised along the edge of streets to give data to street users.

II. PROPOSED SYSTEM

Proposed system is to improve efficiency of existing automatic traffic signaling system. The system will be image processing based adaptive signal controlling. The timing will be calculated each time change automatically depending upon the traffic load. System will have artificial vision with the help of digital camera mounted to face lanes and sense the traffic on the road. Estimated traffic load on particular road will be used to calculate the required time duration for controlling of signal lights based on in comparison with experimental results. System will be intelligent and will calculate the time every time and operate in a cyclic clockwise signal lights control. In the present work the designed system aims to achieve the following.

- Calculate the density of vehicles on the road and set the traffic lights.
- Adjustment of traffic light according to the traffic density.
- Detection of vehicles on zebra crossing when signal is red.

Maximum and minimum time limit will be maintained to prevent over waiting of vehicle in queue of other lanes which would be found out experimentally. Controls of the signal will be routed through the microcontroller. MATLAB programming will be used for simulating and developing the proposed system.

Block Diagram:

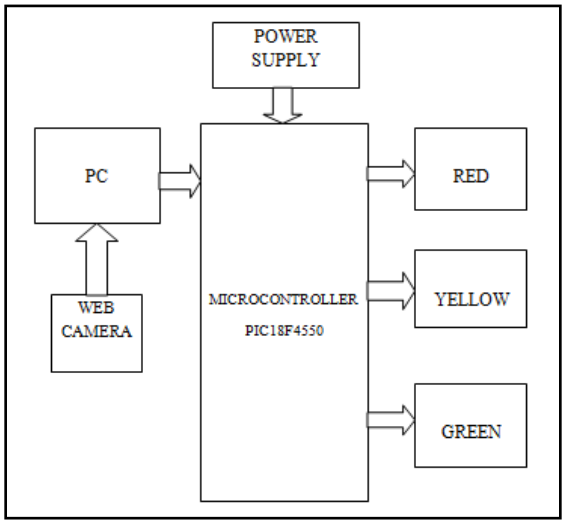

Fig1.Block Diagram Of System

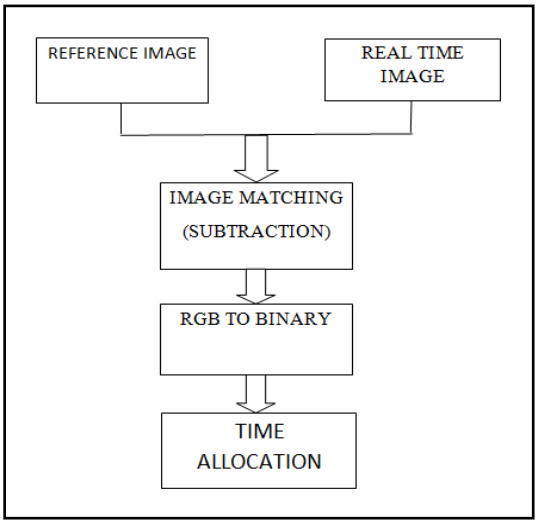

Fig2. Block Diagram Of Image Processing

The Block diagram above gives an overview of how traffic will be controlled using image processing. Various boxes in Block diagram are explained below:

1. **Image Acquisition**

Generally an image is a two-dimensional function f(x, y)(here x and y are plane coordinates).The amplitude of image at any point say f is called intensity of the image.

2. **Image Pre-Processing**

Picture resizing is important when you have to increment or lessening the aggregate number of pixels. Regardless of whether a similar picture resize is played out, the outcome can change essentiallydepending on the algorithm.

In greyscale pictures, be that as it may, we don't separate the amount we produce of various hues; we discharge a similar sum in each channel. We will have the capacity to separate the aggregate sum of discharged light for every pixel; minimal light gives dim pixels and much light is seen as splendid pixels. While changing over a RGB picture to greyscale, we need to consider the RGB esteems for every pixel and make as output a solitary esteem mirroring the brightnessof that pixel.

3. **Image Enhancement**

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further analysis.

4. **Edge Detection**

Edge detection is the name for an arrangement of scientific strategies which go for recognizing focuses in an advanced picture at which the picture brightness changes strongly or, all the more in fact, has discontinuities or noise.

Canny Edge Detection

The Canny Edge Detector is a standout amongst the most generally utilized picture handling apparatuses identifying edges in an extremely hearty way. It is a multi-step process, which can be actualized on the GPU as a grouping of channels. Cannyedge discovery strategy depends on three essential destinations.

- Low error rate
- Edge point should be well localized
- Single edge point response

5. Microcontroller

The PIC18F4550 features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit bus and a Universal Asynchronous Receiver Transmitter (USART).

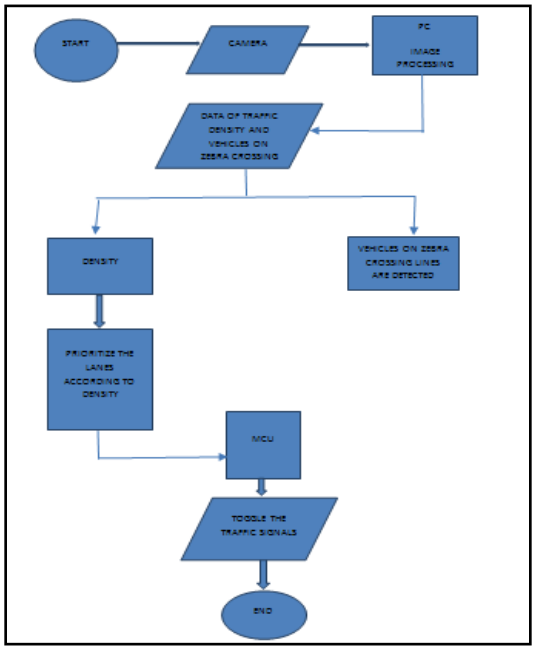

Fig3. Flowchart Of a System

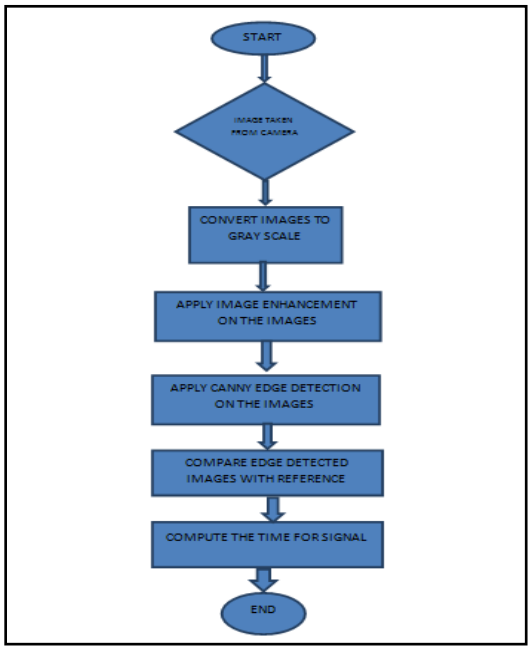

Fig4. Flowchart Of Image Processing

Components used:

Hardware Module:

- Microcontroller PIC18f4550
- Traffic Signals(Led's)
- Web Camera

Software Module:

- PIC18F4550: MPLAB X IDE
- MATLAB: Image Processing in PC

III. APPLICATIONS:

a. Urban areas
b. Transport sector

IV. RESULT:

- **Empty Road:** When there is no vehicles on road image is captured that image is called empty road. This empty road image is saved as reference image at a particular location specified in the program.
- **Vehicles On Road:** Real time image is captured when vehicles on road.
- **Density Of Vehicles:** By using matlab Density of vehicles is shown on a PC.
- **Time Allocation:** According to density of vehicles time allocation is done using PIC18F4550.

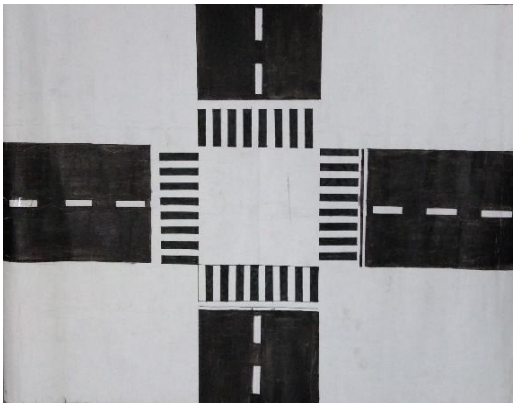

Fig a. Empty Road

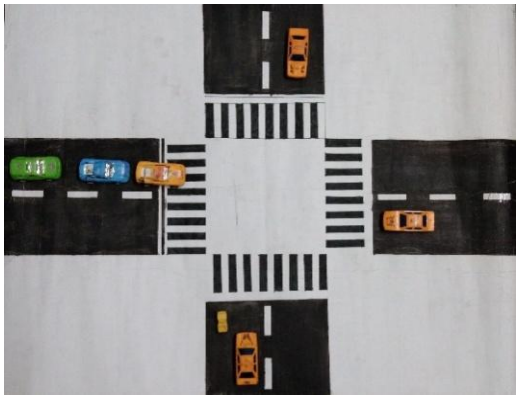

Fig b. Vehicles On Road

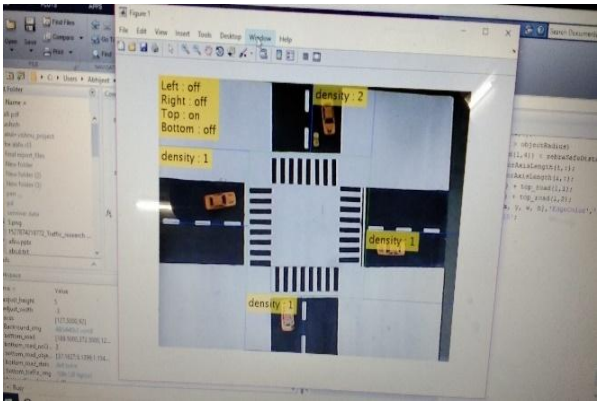

Fig c. Density Of Vehicles

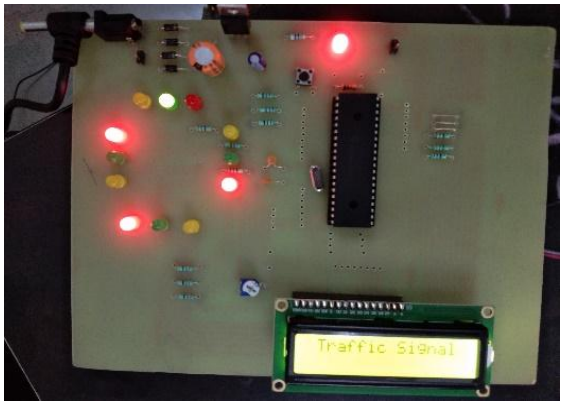

Fig d. Time Allocation

V. CONCLUSION

Intelligent Traffic Light Controlling System using Image Processing is able to process real time data and able to minimize congestion fluently occurring on roads. An image contains real time data and this is picked out by performing image processing techniques. This data given as an input to system and traffic lights are controlled withoutusing microcontroller. It provides best way to control traffic in rapidly growing countries.

VI. REFERENCES:

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