SMART TRAFFIC CONTROL SYSTEM USING LABVIEW

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***ABSTRACT*: As, at every phase we see a huge traffic especially in the busy cities throughout the world. Apart from waiting, one has to spend the resources i.e.., fuel which is indirectly affecting to the environment treasure and also to the human health. Everything being limited, it led to an increasing demand for a traffic count and control system. Though, our project is not much enough to control the resources and time of the people, but it can play a major role in controlling the traffic to the great extends.**

Here, in order to control the traffic issue we have designed a system which will work based on density of the traffic. First, the camera is installed on the pole of traffic light which takes the real time pictures of the traffic from different junctions. Later, the captured image is processed for image acquisition using LabVIEW software. It provides a toolkit which has a complete set for performing image processing to the captured image. With the help of an image processing techniques we are able to find the density, and based on density the traffic light is controlled.

***Keywords*—LabVIEW, MYRio, Traffic density, Count and Control, Image processing.**

I. INTRODUCTION

The main purpose for designing real time traffic density count and control using image processing by LabVIEW is to control the traffic to the great extends. This is implemented by designing a code which is simply based on seven single steps. First, the camera is placed on the traffic signal pole which takes the real time images for further process. The rotation of the camera is decided by the servo motor placed and fixed exactly below to the camera. If the rotation of the camera is meant only for two junctions then the duty cycle must be 50%, and if it is for four way junction then the duty cycle must be of 25%. The process explained above comes under second step. Later, with the help of NI MY Rio, the captured pictures are acquired for image acquisition where the cropping technique takes place. In cropping techniques the images has to undergo for color pane extractions, advanced morphology, threshold technique, also for particle filter and analysis. After performing these processes, the count of density becomes easy for comparison. Based on the highest density of the traffic, traffic signal is decided. Hence these are the steps which are needed to be followed in order to get the count of the traffic density.

Now, the control is based on few cases of the traffic, based on the density. At first, the signal shows yellow color indication which means the camera is analyzing the density of the vehicles present on the road at every junction. After analyzing, comparison takes place. With the highest density of the vehicles, signal turned out to be green and the other side has to be remained in red color. And if both side density is equal, then the control of traffic light signal will be based on the priority.

II. WORKING PRINCIPLE OF THE PROPOSED SYSTEM

In this module, we have implemented our project by using LabVIEW software and Image processing toolkit that is Vision and Motion which provides a different technique for changing the grey level values of an image. Apart from that, we have controlled traffic signal based on density.

A. **Block diagram**

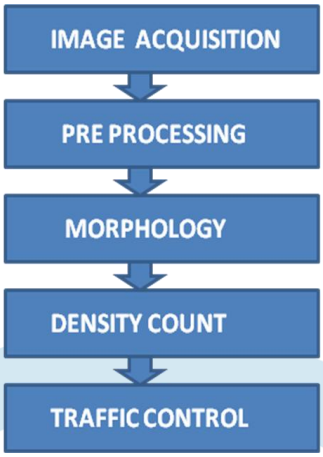


Figure.1

IMAGE ACQUISITION:

Here the picture of vehicles present in the traffic is acquired. After acquiring the image, its color is equalized with the help of color pane extraction in order to change the picture in a gray level value.

Figure 1.1

PREPROCESSING:

It is meant for improvising the image data. In this session, the unwanted abstractions or distortions are removed.

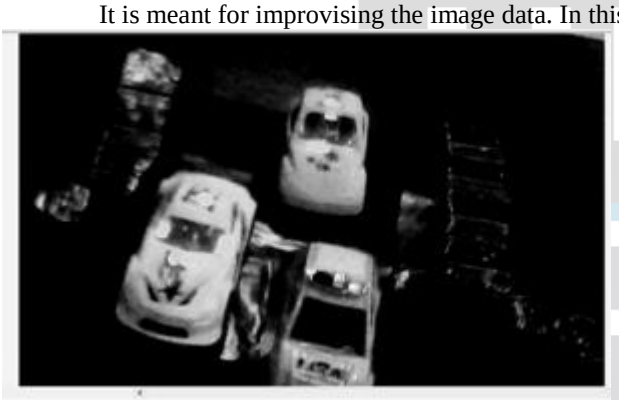


Figure 1.2

MORPHOLOGY:

Perform high-level operations on particles in binary images. Use these functions for tasks such as removing small particles from an image, labeling particles in an image, or filling holes in particles.

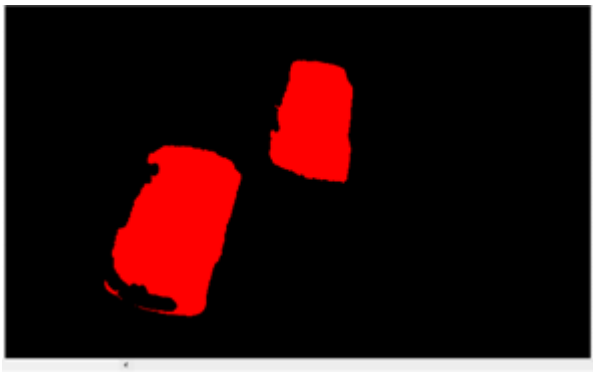


Figure 1.3

DENSITY COUNT:

After performing the above steps, particle analysis displays the measurement as a result for selected particle. This helps in counting the density of the image.

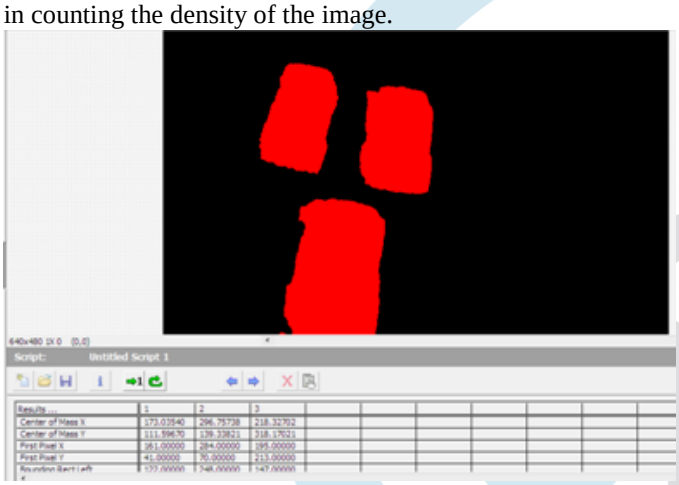


Figure 1.4

TRAFFIC CONTROL:

After analyzing the image, the traffic densities are calculated for both the junctions, and then tended for comparison.

- Initially, both the lights of the traffic junction is yellow for 2 sec.
- During this process camera acquires the image and performs NI vision assistant to it for 2sec.
- Later, based on the higher density the traffic light turns to green for 10sec.
- Then, again it turns out to be in yellow light.
- And the above process continues on four sides.

B. **Circuit diagram**

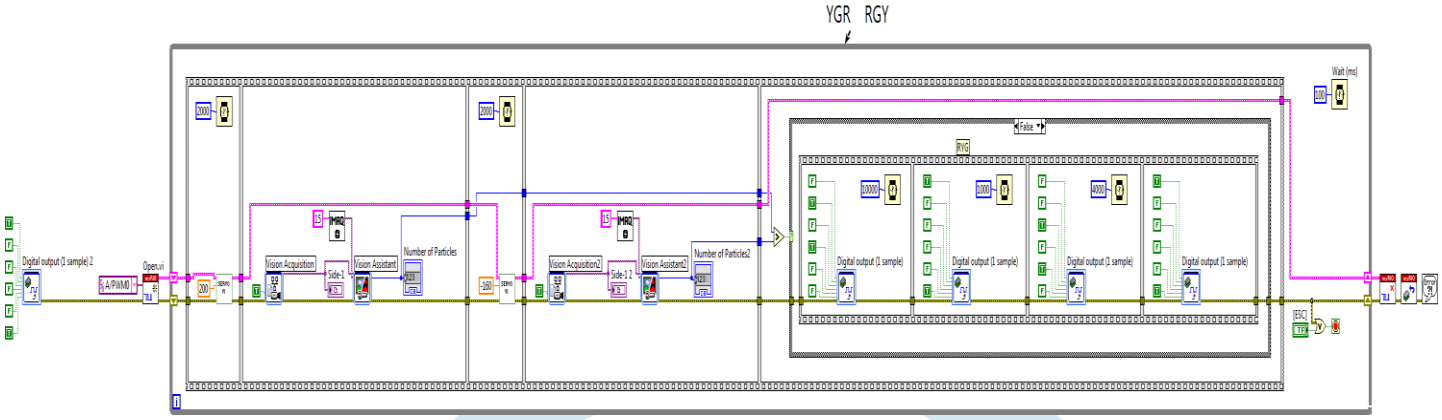


Figure.2

WORKING:
Steps to perform density count and signal control:

STEP 1:

You must open a reference before you use a PWM channel to generate PWM signals.

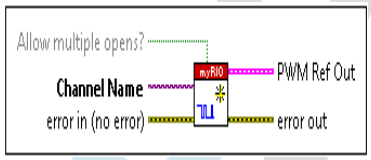
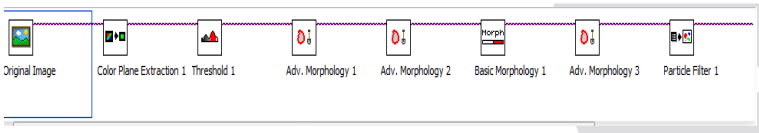


Figure 2.1

STEP 2:

Create a sub VI, in order to perform the operation of servomotor
Figure 2.2

To create a servo sub VI we use



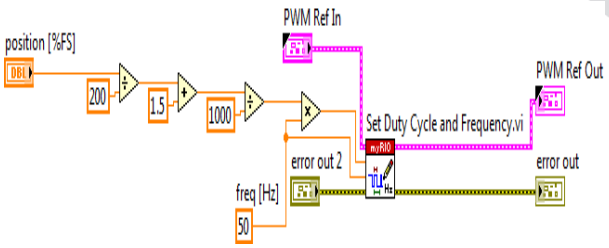


Figure 2.3

STEP 3:

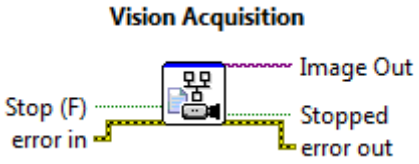


Figure 2.4

Creates, and edits acquisitions using the NI acquisition Express VI

STEP4:

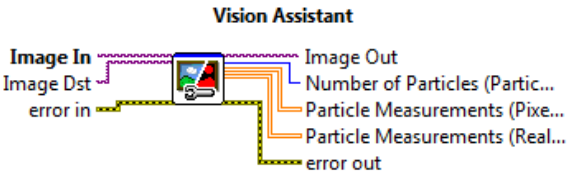


Figure 2.5

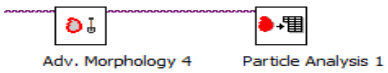


Figure 2.6

Original Image: It acquires color image from the camera which is taken as a input for further processing.

Color pane extraction:

Extracts one of the three color planes (Red, Green, Blue, Hue, Saturation, Luminance, Value, Intensity) from an image. The following controls are available.

RGB – Blue Plane—extracts the blue plane from an RGB image.

Threshold 1:

Segment the each pixel in grayscale images. The Manual Threshold operation enables you to select ranges of grayscale pixel values. Local threshold operations select pixels using a locally adaptive thresholding algorithm. Use local thresholds in applications whose images exhibit non-uniform lighting changes that may result from a strong illumination gradient or shadows. Automatic threshold operations select threshold ranges for you. Use automatic thresholds when you expect uniform lighting changes from image to image.

Manual threshold:

Applies a threshold to the image based on the Minimum and Maximum threshold values that you enter. All pixels not contained between the Minimum and Maximum values are set to 0. All pixels that fall in the range are replaced by 1.

Adv.Morphology1, 2, 3, 4:

Perform high-level operations on particles in binary images. Use these functions for tasks such as removing small particles from an image, labeling particles in an image, or filling holes in particles.

BASIC MORPHOLOGY:

Affects the shape of particles in binary images. Each particle or region is affected on an individual basis. You can use these functions for tasks such as expanding or reducing objects, filling holes, closing particles, or smoothing boundaries, which are tasks you perform to delineate objects and prepare images for quantitative analysis. The following controls are available.

Erode objects:

Eliminates pixels isolated in the background and erodes the contour of objects based on the structuring element. Erosion makes objects smaller.

Particle filter1:

Removes or keeps particles in an image as specified by the filter criteria. The following controls are available.

Particle analysis:

Displays measurement results for selected particle measurements performed on the image.

STEP5:

After analyzing the image, the both side density is calculated and are tend to comparison.

- Initially, both the lights of the traffic junction is yellow for 2 sec.
- During this process camera acquires the image and performs NI vision assistant to it for 2sec.
- Later, based on the higher density the traffic light turns to green for 10sec.
- Then, again it turns out to be in yellow light.
- And the above process continues on four sides.

STEP6:

CLOSE VI

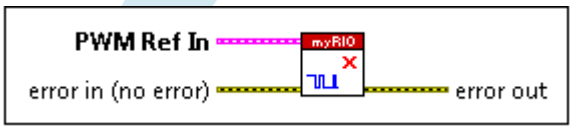


Figure 2.7

Closes the reference to a pulse width modulation (PWM) channel. This VI also disables the PWM signal and resets the frequency and duty cycle to zero.

STEP 7:

RESET VI

Figure 2.8

Resets the FPGA target and all the I/O channels on the my RIO.

ERROR IN: It describes error conditions that occur before this node runs. This input provides standard error in functionality.

ERROR OUT: It contains error information, if any.

III. CONCLUSION:

Method for estimating the traffic density on the lane by using image processing. The advantages of this proposed technique is that there is no need to use aerial imagery or complex sensor based systems. The proposed system is very cost effective as it does not require installation of any additional devices, such as RFIDs.

IV. SCOPE FOR FUTURE WORK:

This work can be enhanced further by proposing a system which identifies the presence of emergency vehicles (like an ambulance or fire brigade) and by giving preference to those emergency vehicles. Secondly, it can be enhanced by using VANETs (Vehicular Ad-hoc Networks) as it provides road safety and intelligent transport system

ACKNOWLEDGMENT

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