

IMAGE PROCESSING BASED INTELLIGENT TRAFFIC CONTROLLING AND MONITORING SYSTEM USING ARDUINO

¹MALLIKHARJUNA RAO. SATHULURI, IE MEMBER

Dept of ECE, ALIET
Vijayawada, A.P., India
smr.aliyet@gmail.com

³PAVANKUMAR. YADAVALLI, IE MEMBER

Dept of ECE, ALIET
Vijayawada, A.P., India
pavan670@gmail.com

²SANTHI KIRAN. BATHULA, IE MEMBER

Dept of ECE, ALIET
Vijayawada, A.P., India
Santhikiran_b@yahoo.co.in

⁴RAMARAO.KANDULA, IE MEMBER

Dept of ECE, ALIET
Vijayawada, A.P., India
kandula.vlsi@gmail.com

Abstract- The tremendous change in vehicle fleet size and consequently in the volume of traffic is not followed by increase in the space of the road in all the time. This causes traffic congestion mostly in all the urban areas. In order to avoid traffic jams, we need to find a solution. In previous decades many technologies were developed and designed solutions to make road ways safer. Some among these techniques were classic where as other are integrated. New designed systems are capable of informing drivers about the traffic conditions and possible hazards of the road way with the help of intelligent transportation system. This project proposes Internet concepts of Things-based approach that solve problems raised by traffic congestion this gives solution to raising traffic related pollution. This architecture is composed of two modules i.e., hardware module and software module. The system utilizes new technologies for real-time collection, organization and transmission which provide the information to estimate the accurate traffic density exploited by traffic-aware applications.

Keywords—Internet action of things, Intelligent Transportation System, Arduino board.

1 INTRODUCTION

In present times the traffic problem is due to the raise in vehicle usage. Traffic flow determination can play a principle role in gathering information about them. This data is used to establish censorious flow time periods such as the effect of large vehicle, specific part on vehicular traffic flow and providing a factual record of traffic volume trends. This recorded information also useful for process the better traffic in terms of periodic time of traffic lights. There are many routes to count the number of vehicles passed in a particular time, and can give judgment of traffic flow. Now a day's camera-based systems are better choices for tracing d vehicles data.

This project focuses on a firmware-based novel technique for vehicle detection. This approach detects the vehicles in the source image, and applies an existing identifier for each of the vehicle. Later it classifies each vehicle on its vehicle-type group and counts them all by individually. The

developed approach was implemented in a firmware platform which results is better accuracy, high reliability and less errors.[1][2]

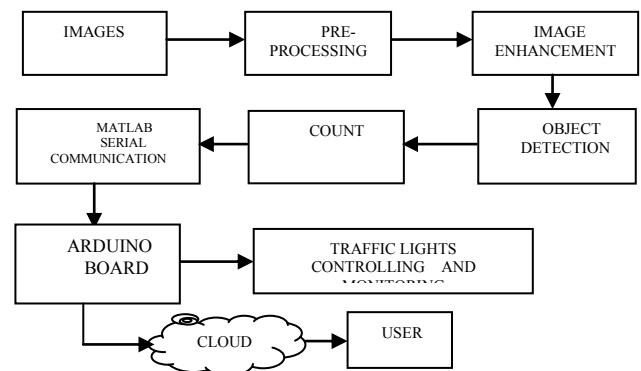


Fig 1.1: Block Diagram

2 DETAILS EXPERIMENTAL

2.1. PRE-PROCESSING

Pre-processing is a technique used to convert RGB color to gray color image. It is done by using luminance converter shown in below equation.

$$I_s = 0.2896 * I_R + 0.5870 * I_G + 0.1140 * I_B$$

I_s is the grey level image. I_R , I_G , I_B are the luminance in red, luminance in green and luminance in blue [3].

2.2. IMAGE ENHANCEMENT

Better contrast and detailed image are provided by enhancing an image compare to a non enhanced one. Some of image enhancement techniques are power-law transformation, linear method and Logarithmic method. Among them, power-

law transformation method is best approach which has the basic formula as shown below:

$$V = K \cdot v^\gamma$$

Where V and v are I/O gray levels, γ & K is a positive constants ($K=1$). Therefore, deciding an accurate utility of γ can play a pretentious action in image heighten process. For attain a Gamma correction, the association between light input and output signals must be taken. This is done by the following equation [3]

$$S(0)=K.(e)(E)$$

$S(0)=K.(e)(E)$ is output gain and K is the exposure time that is related to intensity and linear vehicles.

2.3. OBJECT DETECTION

Edges of an image correspond to object boundaries. These edges are nothing but pixels where the change in brightness may occur and is calculated the behavior of image function in a neighboring pixel. [5].

2.4. COUNT

In order to prevent the problem of traffic in particular destiny we have to know details about number of vehicles and situation. For that a algorithm search a connecting pixels is required to get traffic density.

2.5. SERIAL COMMUNICATION (MATLAB TO ARDUINO)

By using simple MATLAB m-files to communicate with ARDUINO board use MATLAB ARDUINO program for providing communicate link between MATLAB and ARDUINO [4][5].

2.6. ARDUINO BOARD

In the ARDUINO board the program is dumped from the ARDUINO software. By the serial communication the data from the MATLAB transfers to the ARDUINO [4].

2.7. TRAFFIC LIGHTS CONTROLLING AND MONITORING

As per the ARDUINO program the traffic lights will run and the traffic density will be continuously monitored and also controllers density of the traffic on the road in specific direction.

2.8. CLOUD

The density or the count of the vehicles is calculated in the MATLAB and sent through Arduino to the cloud by typing "AT".

2.9. USER

The user can attain information over particular area or junction by signing in to the cloud.

3. RESULTS AND DISCUSSION

3.1. SOFTWARE RESULTS

MATLAB RESULT

- (1) The color image is read from the data base and it is consider as a Input image.



Fig 3.1: Input Image

- (2) After the color image, the RGB is now converted into the gray color image. This process is called Pre-Processing.

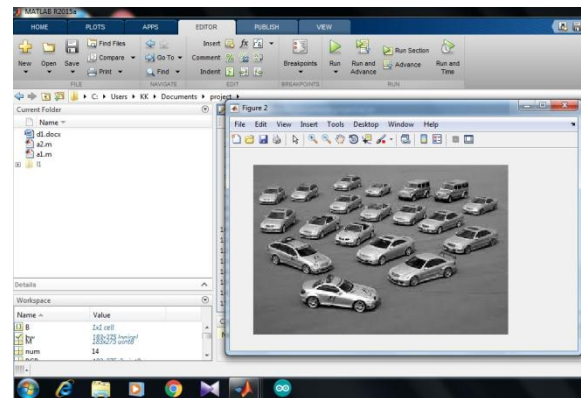


Fig 3.2: Gray Image

- (3) Now the noise which is a salt and pepper noise is added to the gray color image.

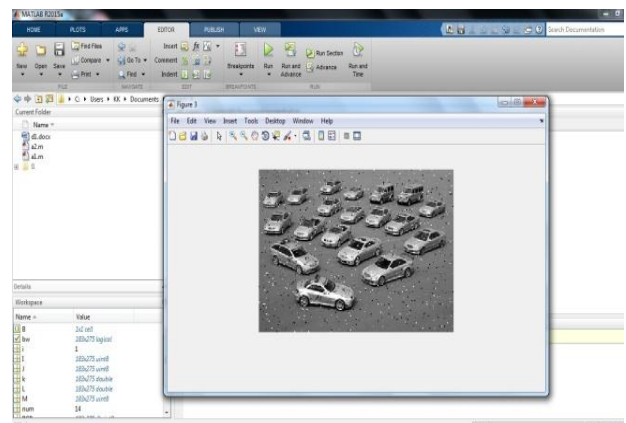


Fig 3.3: Image with Noise

- (4) By using the Median filter, it eliminates the salt and pepper noise from the image.

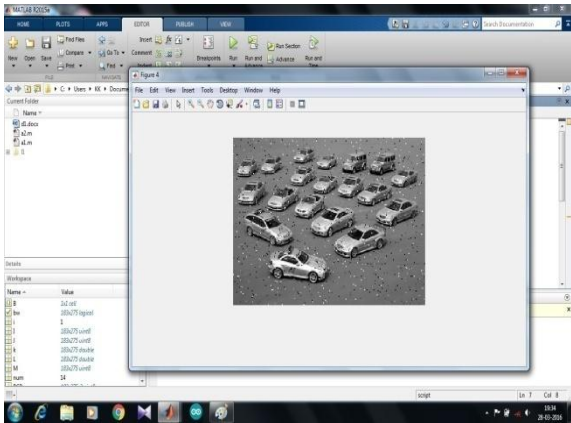


Fig 3.4: Averaging of noise

(5) As Power-law transformation technique is applied, the brightness of the image enhances and also the noise is mostly removed from an image.

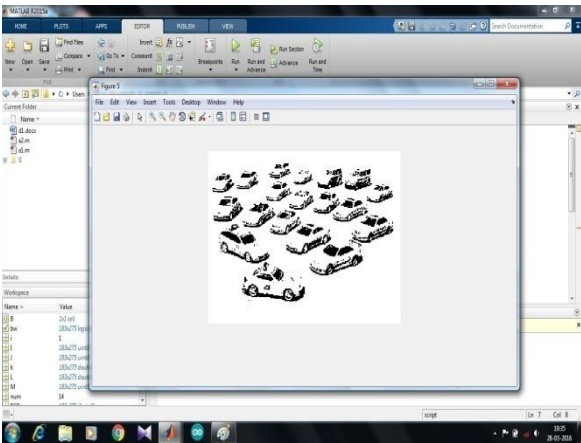


Fig 3.5: Noiseless Image

(6) Finally, the count can be determined using the bw label function. This function counts the number of vehicles in an image and print it.

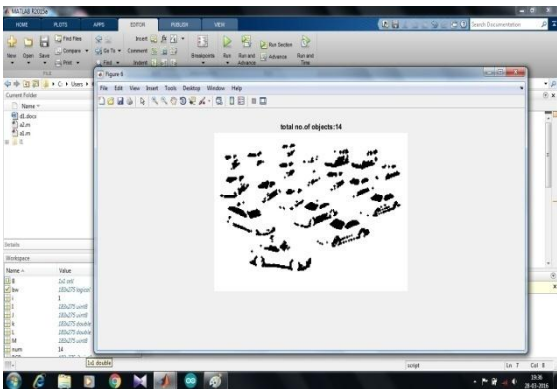


Fig 3.6: Vehicle Count

ARDUINO RESULTS

(1) After writing the code in ARDUINO software, the code is saved and compiling is done.

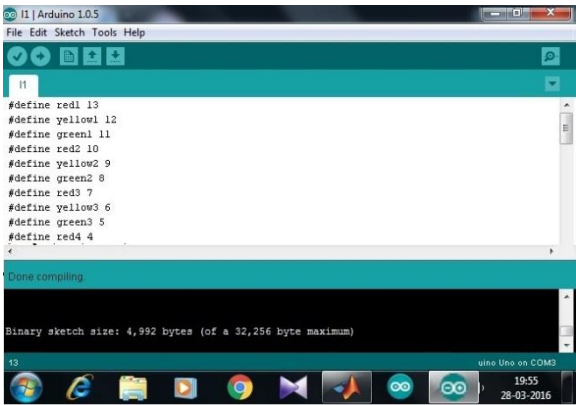


Fig 3.7: Compiling of ARDUINO Program

(2) Before uploading the program into the microcontroller we need to select the board and the serial port from the tool option.

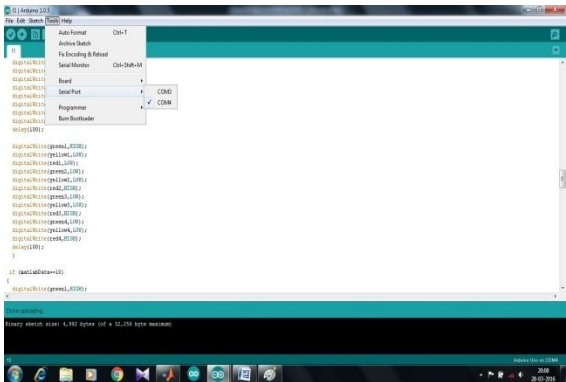


Fig 3.8: Selecting the COM Port

After the compilation if there are no errors then we can upload the program into the microcontroller present on the Arduino board. Before uploading the program no program is present in the microcontroller, so no LED'S will glow or even if there are any errors in the program the code will not dump into the controller. If there are any problems in the interfacing then also the program may not dump correctly.

HARDWARE RESULT

CONDITI ON	EAST	WEST	NORTH	SOUTH
Case-1 (normal)	Green1 On (3.5V)	Red2 On (3.5v)	Red3 On (3.5v)	Red4 On(3.5v)
	Yellow1 Off (0v)	Yellow 2 Off (0V)	Yellow3 Off (0v)	Yellow4 Off (0v)
	Red1 Off (0v)	Green2 Off(0v)	Green3 Off(0v)	Green4 Off(0v)

Delay= 1000 microseconds

CONDIT	EAST	WEST	NORTH	SOUTH
--------	------	------	-------	-------

ION				
Case-2 (More Traffic)	Green1 On(3.5v)	Red2 On (0v)	Red3 On (0v)	Red4 On (0v)
	Yellow1 Off (0v)	Yellow 2 Off (0v)	Yellow3 Off (0v)	Yellow4 Off (0v)
	Red1 Off (0v)	Green2 Off (0v)	Green3 Off (0v)	Green4 Off (0v)

Delay = 2000 microseconds for east

4. CONCLUSIONS

In this modern era as the population is increased rapidly the usage of vehicles has also increased tremendously. The cause of it is heavy traffic. In order to avoid this problem it is better that we flow new communication methods such as image processing based intelligent traffic controlling and

monitoring system using ARDUINO. By using this method we can get the details about information about vehicles in particular junctions through internet access. This is more beneficial for the emergency travelling.

REFERENCES

- [1] Vikramaditya Dangi, Amol Parab, "Image Processing Based Intelligent Traffic Controller", Undergraduate Academic Research Journal (UARJ), ISSN : 2278 – 1129, Volume-1, Issue-1, 2012.
- [2] Raoul de Charette and Fawzi Nashashibi, "Traffic light recognition using Image processing Compared to Learning Processes".
- [3] Mriganka Panjwani, Nikhil Tyagi, Ms. D. Shalini, Prof. K Venkata Lakshmi Narayana, "Smart Traffic Control Using Image Processing".
- [4] Shiu Kumar"UBIQUITOUS SMART HOME SYSTEM USING ANDROID APPLICATION" International Journal of Computer Networks & Communications (IJCNC) Vol.6, No.1, January 2014
- [5] M.Fathy,M.Y.Siyal,"An image detection technique based on morphological edge detection and background differencing for real time traffic analysis," pattern recognition letters,vol-16,pp.1321-1330,1995.