Recent Advances in Technology and Engineering (RATE-2017)
6th National Conference by TJIT, Bangalore

International Journal of Science, Engineering and Technology
An Open Access Journal

Density Based Traffic Monitoring System Using IOT Technology

Varsha Rabde, Mayuri Kharge, Priyanka Mane, Shubhashri Salunkhe, Anupama K. Ingale

Abstract

In this paper we proposed a density based traffic monitoring system. Now a days due to increase in population number of vehicles are also increasing. People are changing their living of standards. Vehicle is one the most important in everyone's life. In urban area population of vehicles are increasing so control on streets, highways and roads is major issues. The main reason behind developing this traffic monitoring system is the inefficient today's traffic management system. In today's traffic monitoring system traffic light shows fixed timing for changing the signal so the time wasted on unwanted green signal (green signals, when there is no traffic)so we can save the time by designing the system which shows the appropriate timing for traffic and unwanted green signals. Simplest way to control traffic is to give the timer for every lane. This project not only count the number of vehicles on road but also measure density covered by vehicles on the road, so the timing for signals gives according to the density on road. The web camera situated on traffic lane captures the image of road then these images are processed to know the traffic density on that particular road. According to the processed data controller will send the command to timer to show the time on the signal to manage traffic on the road.

Keywords: Arduino, stepper motor, Image Processing, density calculation, PCB board, camera.

Introduction

Human is most intelligent creation of god and for easy, comfortable and sustainable life he invented new technologies day by day. With the help of new technologies people are improving their standard of living. As we know that, increasing number of cities, number of vehicles is also increases so traffic congestion problem arises. There are two cases in traffic congestion First one is no traffic on road but still wait for signal and the second one is heavy traffic jams. These problems are arises due to the fixed control on traffic signals. Fixed control on traffic signals means we can't control the traffic according to the density on road.

To solve this problem of a fixed traffic signal light control system, we are introducing the system control traffic which is based on density of road and we named that system is 'Density based traffic monitoring system'. It is the system which regulates itself according to the density on road. Traffic congestion is become a main problem in the modern era. The main reason of the traffic congestion problem is increase the population in the cities. Usually in metro cities there is an incompetent traffic signal light controlling which affect on the flow of traffic? For example, if in one road which has less traffic and in other road has heavy traffic but timing of green light for both the road are same so it is waste of time for road in which has less traffic .By considering above example the road which has higher density should switch on the red light for longer period and the lane which has lower density should switch on green light for shorter period. There are many techniques proposed to design an intelligent traffic system.

We proposed technique is to control the traffic signal by using image processing, the main goal behind

designing this project is to reduce the drawback of existing system with the help of image processing and IOT technology.IOT technology help us to enable the signal on the basis of density value which is counted with help of different image processing techniques, in which default image is compared with captured live image. Every time first image i.e. image of road with no vehicle is matching with live images on the basis density value traffic lights controlled on the road and this technique image matching is performed by the edge detection.

BACKGRAOUND AND RELATED WORK

K.Vidhya [1] author has described the signals are automatically changes by sensing the traffic at junction. The image of vehicle captured in traffic signal is processed and converted into gray scale image. It also calculated threshold so number of vehicles are counted and after counting the number it will know that in which side density is higher. on the basis of that signal will be allocated that side.

Vikramaditya Dangi [2] in this paper author has given traffic light signal is control by using image processing. Here object count and edge detection techniques are used which is more efficient. Author also proposed the system for emergency vehicle and if emergency vehicles are detected then system gives the priority to that road over all the other, it leads to wait other vehicle unnecessarily.

Chandrasekhar. M [3] author has implemented this system using Image acquisitions, RGB to gray conversion, edge detection and image mapping techniques are used. In image acquisitions two dimensional functions are used .In RGB to gray conversion image is stored into three matrices one is for green, second is for red and third is for blue. In image mapping one image is compared with all other edges of images. Edge detections techniques are also used in this system and for edge detection canny method is used. The major drawback Computation time is higher.

Akanksha Mishra [4] they have proposed the system using IR sensor is that is used for traffic control system. Many technologies are used in this paper such as RFID, GSM technology and wireless sensor network.IR sensor detect no. of vehicles on road. Microcontroller decide signal of traffic light. Wireless sensor is used for detecting the direction for emergency vehicle. but the major drawback of the system is implementation of this system is not real time.

Rashishet Aparajita Sahoo [5] in this paper system is design in such a way that DC motor is used for the rotating the camera, connection of the system is between arduino and microcontroller. The sending of data serially arduino board to MATLAB and data is processed on arduino board. And final output is given to the traffic light. The major drawback of the system is system gives higher priority to higher density of lane so it will wait to the lane which have lower density and which is time consuming.

Jaywant Kamble [7] author has proposed system by using Webcam, Computer and Microcontroller & LED display installed in each junction. The image sensor senses image of Traffic & onboard processor of image sensor performs compression & converts the image into its own format & through USB transmit to the processor using Image processor software which process the image & detect the number of vehicles in image and it count the number of vehicles. This final count is given to master microcontroller through serial communication using RS232.the major drawback is if big vehicle is on the road and behind that a small vehicle is their then it cannot detect those vehicle.

PROPOSED SYSTEM

The proposed system reduces the over waiting time of vehicles in such a way that camera is used to capture the images of each lane and respective images then compared with empty lane image and density calculation is done and based on that density value priority is set to the lane having lowest density. System reduces Traffic congestion which occurred in the existing system. Traffic light uses timer for every phase. The density based traffic monitoring system reduces human efforts, energy efficiency and save time.

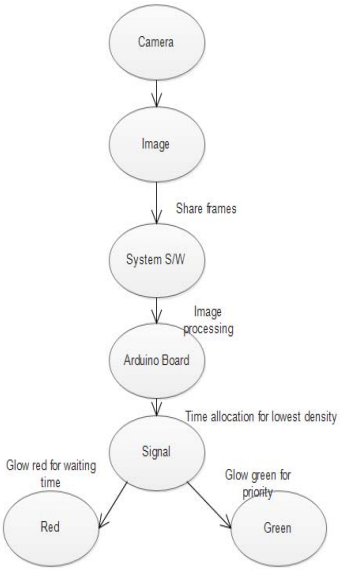

Fig: 1 flow chart

BLOCK DIAGRAM

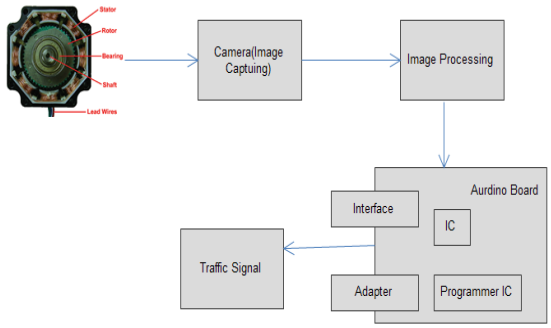

Fig: 2 Block Diagram

The above figure shows block diagram of whole system. First one is stepper motor. On this stepper motor camera is situated. This is capturing the live images of vehicles on the road. Then the image processing technique is done on captured images. After image processing it generates density value. Those values passed to arduino board. Some programming is done on arduino board .According to the density value signal glows.

METHODOLOGY

Capture images of traffic through camera.

The images of all the lane is captured using camera and then those images send for the image processing to the S/W which is developed by using eclipse IDE and the language use to design this software is java programming.

i. Calculation of the density is done in the S/W.

ii. The density values are share with arduino board for the purpose of allocation of time to each lane according to their value of density. Images compared on the basis of their density, and then priority set to the lane having lowest density.

1. Display the signal on traffic road according to density.

SYSTEM IMPLEMETATION

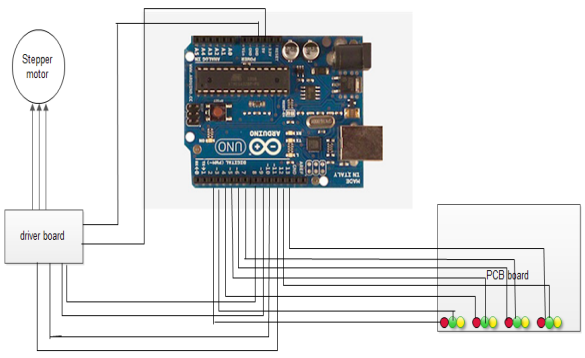

Fig: 3 Pin structure

Working of the proposed system is: Arduino board is connected to computer using USB cable. Motor driver is connected to arduino board for power supply through GND pin of Arduino and +ve and –ve pin of stepper motor driver.IN1,IN2,IN3,IN4 these pins are connected to the Arduino board pin 8,9,10,11 to load the Arduino program into the IC of motor driver. Next four pins are responsible for rotating motor at different stages by 90^{0} by receiving the command from IC. For blinking LED 9 pins are require, there are 8 LEDs for indication purpose. According to working principle one green LED should glow for releasing traffic at the same time red LED should glow on rest of three lanes for waiting time. Registers are used to maintain voltage.

Software Module

As shown in fig 4 images of each lane is captured by the camera. Captured images then compared with the empty lane image to calculate density value. Calculated density is shown in grayscale image. This density value is then sending to the arduino board. Arduino board passes this command to the LED via jumper wire. The lane having lowest density green LED is on for the given time span and rest of all are waiting which is indicated by red signals.

Fig: 4 Picture depicts density calculation

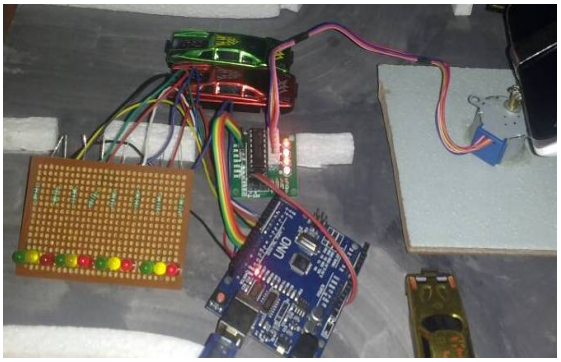

Fig: 5 Picture depicts connection of hardware

ACKNOWLEDGEMENT

We would like to express our heartfelt gratitude towards our inspirational guide mentor Asst. Prof. ANUPAMA INGALE, whose firm belief in our

capabilities to bring our potential to the fore front has played a major role in the accomplishment to this project.

CONCLUSION

In this project we studied the image processing is better method to control the traffic light. It shows that in this it reduce the traffic load of the road and avoid the over waiting time on heavy road and time wasted by a green signal on an empty road. It is more standard for the detecting the vehicles on the road because it use actual traffic images. it shows better function reality than the existing system which are used the detection of vehicles.

References

[1] K.Vidhya, A.Bazila Banu. "Density Based Traffic Signal System" January 2014, Velammal College of engineering and technology.

[2] Vikramaditya Dangi, Amol Parab, Kshitij pawar and S.S. Rathod. "Image Processing Based on Intelligent Traffic Controller System." January 2012 Sardar patel college of engineering Mumbai.

[3] Chandrasekhar, M Saikrishna, C Chakradhar, B Phaneendra Kumar & Sasanka,"Traffic Control Using Digital Image Processing", Student of K L University".

[4] Akanksha Mishra, Kaumudi Singh, "Density Based Intelligent Traffic Control System Using IR Sensors,"Raja Balwant singh engineering and technical campus Bichapuri, Agra".

[5] Rashishet Aparajita Sahoo, Aparna Indore, Vaibhav Deshmukh, Pushpa." U S.Fr. C Rodrigues Institute of Technology, Vashi".

[6] Vismay Pandit, Jinesh Doshi, Dhruv Mehta, Ashay Mhatre and Abhilash Janardhan, "Smart Traffic Control System Using Image Processing".

[7] Jaywant Kamble, Pratik Kothawade, Abhijeet Kumbhar, Prof. Rajani P.K. "Traffic Control System Using Image Processing".

[8] Payal Gupta1 , Dhananjay V. Gadre, Tarun Kumar Rawat, "real time traffic light control system".

[9] K. Vidhya, D. Anandhavalli, "Density Based Traffic Signal System Using Computer Vision".

[10] Nikhil Lende, Prof.S.S.Paygude, "Survey on Traffic Monitoring System using Image Processing".

Author's details

[1, 2, 3, 4] Student, Department of Information Technology, Rajarambapu Institute of Technology,Islampur India, varsharabde@gmail.com

mayurikharge33@gmail.com

priyankamane6682@gmail.com

shubhashrisalunkhe@gmail.com

[5]Department of Information Technology, Rajarambapu Institute of Technology,Islampur India,

anupama.ingale@gmail.com