

Adaptive Smart Crossing and Traffic Density Monitoring System Using an Image Processing

Prof: S.A.Shaikh.
Associate Professor
In Electronics Engineering,
Pravara Rural Engineering College.Loni,

Bansode Sagar¹
Student of B.E. Electronics
Engineering ,P.R.E.C.Loni

Dighe Shubham²
Student of B.E. Electronic
Engineering ,P.R.E.C.Loni

Ghodake Dnyaneshwar³
Student of B.E. Electronics
Engineering ,P.R.E.C.Loni

ABSTRACT: Adaptive traffic control and traffic density monitoring system aims at automatically adjusting released time of vehicles as per density available to the roads at the intersection .and it display the change time to pedestrians for crossing the road. The proposed system uses a web camera connected to computer placed at center place of intersection and stepper motor will rotate camera at 90 degree to each road for capturing vehicles images. Traffic control signal will be routed from the microcontroller. MATLAB programming environment will be used for simulating actual road traffic and compute traffic released time for each road. The traffic density information from traffic control unit will receive at traffic monitoring section i.e.,computer and display real time graph of all four roads on computer. Depending on the number of vehicle my embedded system will generate signal effectively to control the flow of traffic

Keywords— *Image Processing; Adaptive System ; Smart Crossing; Traffic Light; Pedestrian etc.*

I INTRODUCTION

Since people and vehicle are sharing the road, crosswalk increases efficiency of using the road in highly concentrated area. However, as the population increases, this brings more frequent accidents and more serious injuries and hence, nationals are trying to .reduce these accidents. Such actions pull down the total number of fatal accidents but unfortunately, number of pedestrian fatalities does not decrease for a decade In this paper, we propose a crosswalk system using camera image processing. Image processing is better technique to control traffic density in real time system.it shows that it can decrease traffic congestion and avoids time being wasted by green light on an empty roads .It is also more reliable in estimating vehicles presence because it uses actual traffic images .The time interval for every lane changes according to density. The changed time will displays to pedestrians present on the road sides and they will know the time for signal to change .According to that time pedestrians cross the road safely.

II. RELATED WORK

K.Vidhya et al. [1].Density Based Traffic Signal System.In this paper the signal timing changes automatically on sensing the traffic density at the junction By using sensors the sensors are very expensive and need a lot of maintenance. Pallavi Choudekar et al.[2]. calculate the density of the vehicle by using matlab tool by comparing the four side of the image which is given as a input. we can simulate the result of the four given input image but this cannot be used in real time applications as it is very slow by In contrast, video-based systems offer many advantages compared to traditional techniques.

Vikramaditya Dangi et al.[3].Successfully implemented an algorithm for a real-time image processing based traffic controller. Upon comparison of various edge detection algorithms, it was inferred that Canny Edge Detector technique is the most efficient one.Shakil Shaikh et al.[4] demonstrated project on traffic density estimation and flow control based on image processing technique and have successfully calculated the traffic and also implanted a signal system which shows the vehicle the direction on road.

Giovanni Pau et al. [5]. A fuzzy-based approach to deal with the dynamic management of traffic lights in pedestrian crossing has been presented. The suggested solution provides the possibility to change the phases of the traffic light taking into account the time of the day and the number of pedestrians about to cross the road.Mr.Parthipan V. et al.[6].In our proposed model, we estimate the density of the vehicles in each lane based on weights. The surveillance is done based on the density detection. Priority is given to the emergency vehicles & various modes of vehicles are used. The propose model ensures road safety & enforces strict traffic control.

Arif A. Bookseller et al.[7] System is estimated to be accurate 80% and even more depending on the accuracy of ROI used to estimate occupancy. Major advantage is the variation in signal time which control appropriate traffic density using artificial vision. Albagul et al. [8].Various techniques have been presented for traffic control system. Inductive loops and infrared object sensors are most common detection systems to measure traffic flow on roads. Sensors based traffic control for controlling traffic.

Madhura. R et al.[9]. By using this system we were able to successfully build a system to control and manage traffic signals to avoid traffic congestion caused due to traffic signals. The number of IR sensors blocked decides the density range of traffic and on this basis traffic lights are prioritized to lanes with highest number of IR sensors blocked.D. Prakash et al.[10]. The method of vehicle detection and counting from an image has been implemented using matlab and ARM development board and LPC 2148 microcontroller pre-doctored images were processed in matlab and its density was calculated. A microcontroller, LPC2148 ARM processor was used to control the traffic signal.

III. PROPOSED SYSTEM

The proposed System is Adaptive traffic control and traffic density monitoring system aims at automatically adjusting released time of vehicles as per density available to the roads at the intersection. The proposed system uses a web camera connected to computer placed at center place of intersection and stepper motor will rotate camera at 90 degree to each road for capturing vehicles images. Controls of the signal will be routed through the microcontroller. The project is designed to develop a density based dynamic traffic signal system. The signal timing changes automatically on sensing the traffic density at the junction. Traffic congestion is a severe problem in many major cities across the world and it has become a nightmare for the commuters in these cities. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density.

Block Diagram of System and Description:-

4.1 MICROCONTROLLER UNIT:

The ARM7TDMI-S could be a general purpose 32-bit silicon chip, that offers high performance and really low power consumption. The ARM® design relies on Reduced Instruction Set pc (RISC) principles, and therefore the instruction set and connected rewrite mechanism square measure a lot of easier than those of small programmed complicated Instruction Set Computers. This simplicity leads to a high instruction output and spectacular period interrupt response from a little and efficient processor core. Pipeline techniques square measure used so all elements of the process and memory systems will operate ceaselessly

4.2 RFID:

Radio-frequency identification (RFID) uses magnetism fields to automatically confirm and track tags connected to things. The tags contain electronically-stored data. Passive tags collect energy from a close-by RFID reader's interrogating radio waves. Active tags have a district power provide (such as a battery) and can operate several meters from the RFID reader.

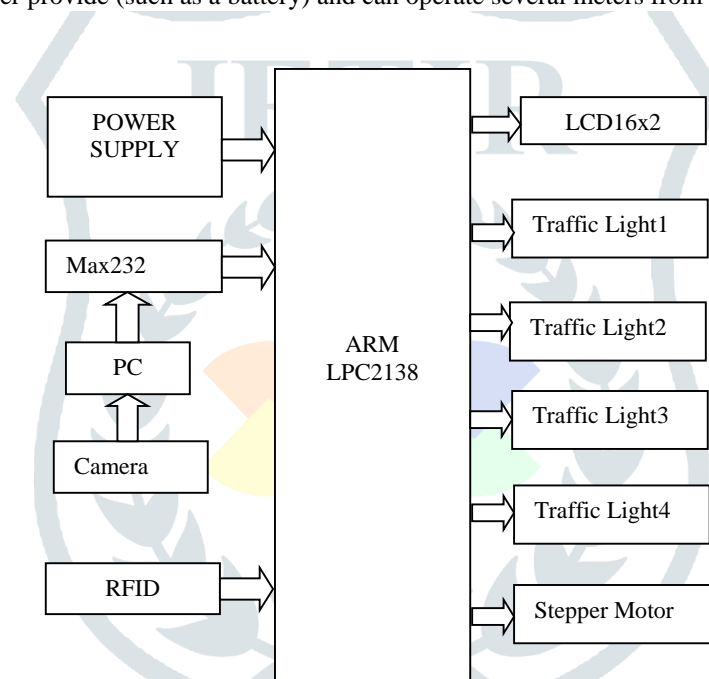


Fig.1:- Block diagram of system

4.3 CAMERA:-

Traffic cameras square measure AN innovative and intensely used for capture the \$64000 time pictures. we've seen these pictures throughout traffic on the computer. By exploitation image process we tend to monitor traffic. Traffic cameras placed at common congestion points on highways, freeways, interstates and major arteries typically share feeds with news retailers - each radio and television, that successively pass them onto commuters within the style of traffic reports.

4.4 LCD

LCD is employed as a district of a venture to imagine the yield of the appliance. we've used sixteenx2 liquid crystal display that demonstrates sixteen segments and one or two of lines. Thus, we are going to compose sixteen characters in every line. through out this methodology, add up to thirty 2 characters we are going to show on 16x2 liquid crystal display. liquid crystal display can likewise use in an exceedingly } very venture to ascertain the yield of various modules interfaced with the microcontroller. on these lines liquid crystal display assumes a necessary [*fr1] in an exceedingly } very venture to look at the yield.

4.5 RS232:

RS232 may be a commonplace protocol used for serial communication, it's used for connecting pc and its peripheral devices to permit serial information exchange between them. because it obtains the voltage for the trail used for the info exchange between the devices. it's employed in serial communication up to fifty feet with the speed of one.492kbps.

4.6 Stepper Motor

Stepping motor may be a brushless DC motor that divides a full rotation into variety of equal steps. The motor's position will then be commanded to maneuver and hold at one in every of these steps with none position device for feedback (an open-loop controller), as long because the motor is fastidiously sized to the appliance in relevance torsion and speed. Control – Precise increments of movement conjointly yield wonderful management of motion speed for method automation and artificial intelligence. Low Speed torsion - traditional DC motors haven't got substantially torsion at low speeds.

V. SOFTWARE (ALGORITHM &FLOWCHART):**5.1 ALGORITHM For PC**

1. Start.
2. Take image from 4 junctions.
3. Images taken from all junctions?.
4. Convert images to Gray scale.
5. Apply images enhancement on the images.
6. Apply canny edge detection on the images.
7. Compare edge detected images with reference.
8. Compute the Green light timing for each junction.
9. Send information to microcontroller.

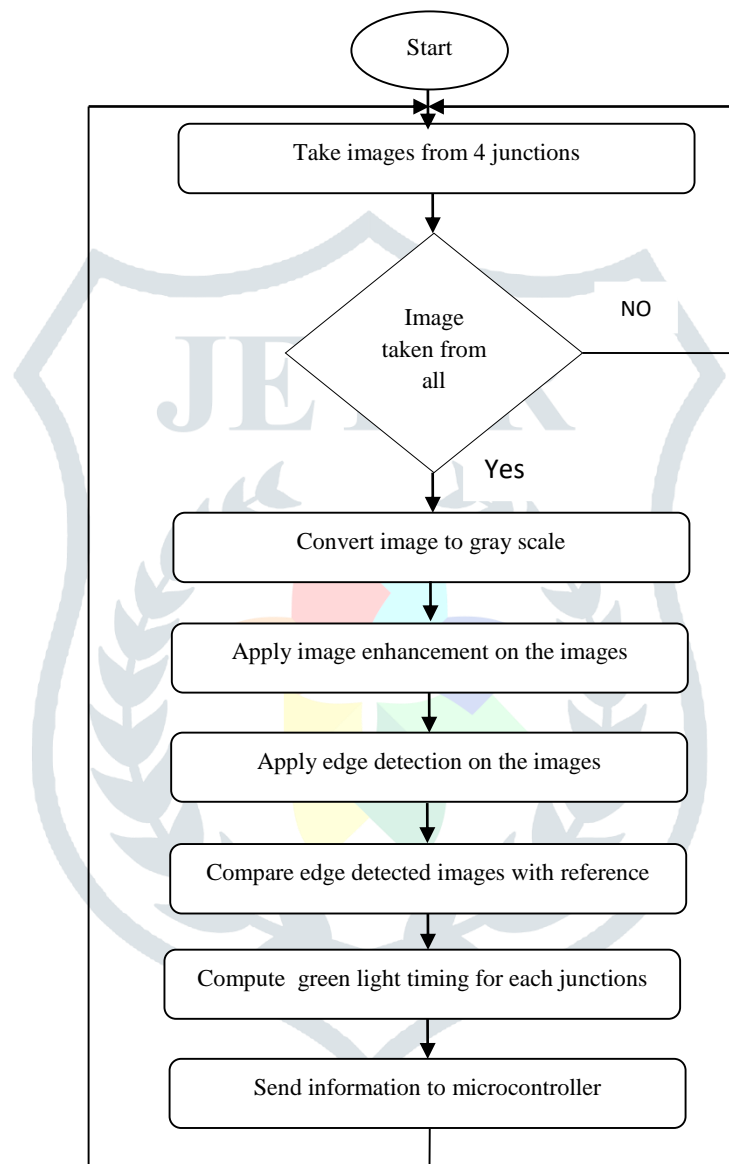
5.2 FLOWCHART FOR PC

Fig2:- Flowchart

5.3 ALGORITHM FOR MICROCONTROLLER

1. Start.
2. Check the information from pc.
3. If no information from pc go to step2.
4. Process the information as per program.
5. Activate traffic light.
6. Wait for determined time by the program.
7. Go to step 2

5.4 FLOWCHART FOR MICROCONTROLLER

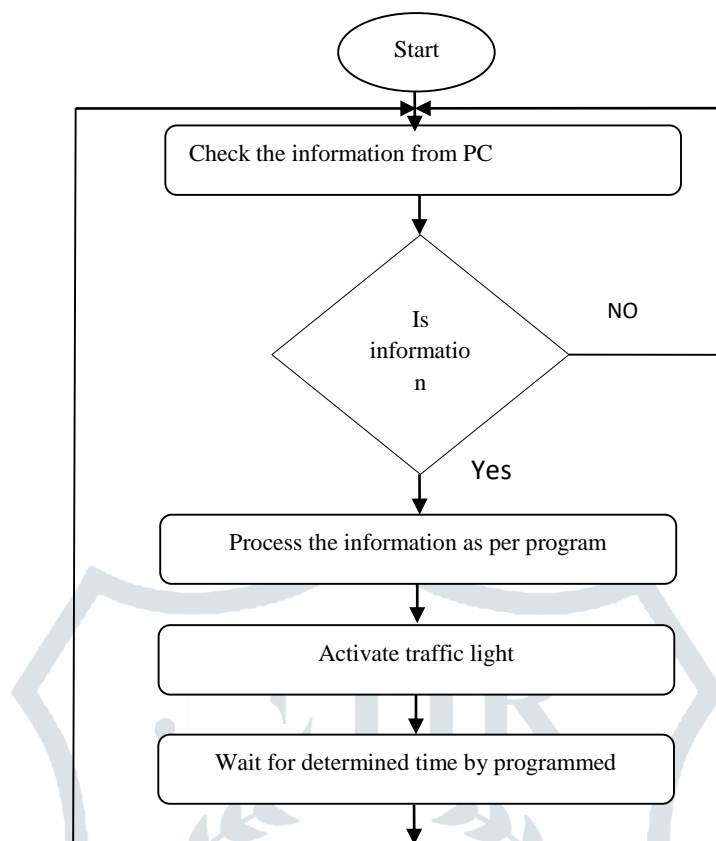


Fig3:- Flowchart

RESULT:-

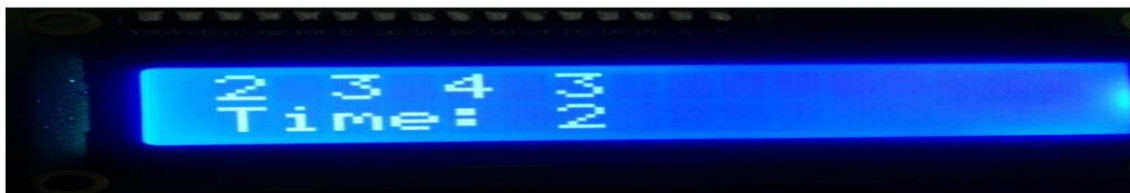


Fig4:-LCD Display

In the proposed system we first take the images of four sides from road. Then captured images are process using image processing in matlab.Captured images are compared with reference image and green light time for each side is decided by the controller.as we programmed one sec time for one vehicle.also we have used RFID for emergency vehicle purpose. So that if any emergency vehicles like ambulance is detected first preference given to that vehicle.

Conclusion

In the proposed system we control traffic density on the different lane based on image processing and give way to pedestrians for crossing. Image processing can use to count the number of vehicles that are passing on the highway and to control the traffic signal time. These are advantageous technique over such as the use of Ariel imagery, complex sensor-based system and using any additional devices. The image is acquired by the camera and it's being placed at a particular height. The vehicle count is found out by using bounding box property, further according to the traffic control algorithm we can allocate the time limit to the particular lane according to the traffic density. The use of emergency vehicle detection algorithm helps to detect the vehicle such as ambulance, fire vehicles etc. It can be done by using RFID. It helps to give the priority to those emergency vehicles. The controlling of traffic light takes place through the microcontroller and accordingly the traffic light control based on the priority assigned.

ACKNOWLEDGEMENT

Inspiration and guidance are invaluable in all aspects of life, especially what is academic. We fail to find the adequate words to express the deep sense of gratitude to our respected Head of Department of Electronics Engineering **Mrs. S .S. Lavhate** who put their careful guidance and interest through which we have completed our paper work. A special tribute must be extended to our project Guide&Co-ordinator

Mr. S. A. Shaikh for his untiring efforts, patience and unswerving commitment to excellence that has help for the completion of the project.The indebt necessity for encouragement, help and sympathetic attitude which we received from them during preparation of our work cannot be expressed in words.Last but not the least we would like to remember our family members with whose continuous inspiration; this work wouldn't have been successfully completed. Every work is the outcome of full proof planning, continuous hard work and organized team effort. This work is the combination of the all above together, sincerely.

REFERENCES:

- [1] K.Vidhya, A.BazilaBanu “Density Based Traffic Signal System” Post Graduate Student Dept of Information Technology, Velammal College of Engineering and Technology, Madurai, India.
- [2] Pallavi Choudekar,.Sayanti Banerjee,.M.K.Muju “Real Time Traffic Light Control Using Image Processing”, Indian Journal of Computer Science and Engineering (IJCSE) ,Vol.2, pp.0976-5166,2014
- [3] Based Intelligent Traffic Controller” Electronics and Telecommunication Dept., Sardar Patel Institute of Technology, Mumbai, India.
- [4] ChhayaVikramaditya Dangi, Amol P arab, Kshitij Pawar& S.S Rathod. “Image Processing Aher1, Shakil Shaikh 2. “Adaptive Traffic Control and Traffic Density Monitoring System using an Image Processing” International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 11, November 2015 IJAREEIE DOI:10.15662/IJAREEIE.2015.0411081 9349
- [5] Giovanni Pau * ID , Tiziana Campus ID , AntoninoCanale ID , Alessandro Severino ID , Mario Collotta ID and Giovanni Tesoriere ID “Smart Pedestrian Crossing Management at Traffic Light Junctions through a Fuzzy-Based Approach” Received: 3 January 2018; Accepted: 30 January 2018; Published: 1 February 2018
- [6] Mr.Parthipan1 V, Dr.D.Dhansekaran2, Ms.Saranya M3 Saveetha “REAL TIME SMART TRAFFIC SIGNAL AND TRAFFIC DENSITY CONTROL SYSTEM WITH PEDESTRIAN CROSSING BASEDON IMAGE PROCESSING” School of Engineering, Saveetha University, Chennai.com Received on: 10.08.2016 Accepted on: 06.09.2016
- [7] 1Arif A. Bookseller, 2Rupali R Jagtap “Image processing based Adaptive Traffic Control System” IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) ISSN: 2278-2834, ISBN: 2278-8735, PP: 33-37
- [8] A. Albagul, M. Hrairi, Wahyudi, M. F. Hidayathullah, “Design and development of sensor based traffic light system”, American Journal of Applied Sciences, pp.1745-1749, 2006.
- [9] Madhura.R, Arpitha.A .N, Hemanth Kumar S.R, Indushree B.C “Density Based Traffic Control System with Priority for Emergency Vehicles” Department of Electronics and Communication Engineering Dayananda college of Engineering, Bengaluru.
- [10] Prakash (1),B. Sandy Devi(2) , Naveen Kumar(3), S.Thiyagarajan (4), P.Shabarinath “Density Based Traffic Light Control System Using Image Processing” International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (An ISO 3297: 2007 Certified Organization) Website: www.ijareeie.com Vol. 6, Issue 3, March 2017