SAMQUEST-Journal of Emerging Innovations
E-ISSN 3108-1207
Vol.1,Issue 2,pp.267-270 , July- Dec 25
Available online at : https://www.samglobaluniversity.ac.in/archives/

Research

Image Processing Based Intelligent Traffic Control System

Veerendra Kumar Sen[1], School of computer Sciences. SAM Global University Bhopal
Saurabh Mandloi[2],School of computer Sciences. SAM Global University Bhopal
Corresponding E-mail saurabhm.research@gmail.com

Received:13/July/2025; **Accepted**:16/July/2025 ;**Published**:7/Feb/2026

Abstract:

One of the major problem faced bytoday's world is traffic congestion in many cities. Nowadays traffic problems are increasing because of the growing number of vehicles. Currently used system to solve these traffic problemis by using the timer implemented with the traffic signal in the junction in cycles. We propose a system for controlling traffic signals and to help the pedestrians standing alongside the zebra crossing in traffic junction using image processing. A camera is initialized alongside the traffic signal which captures the images and detect the number of vehicles at each sides. The green signal is shown in the side which have more vehicles and so on. Number of pedestrians is also detected and if the number of pedestrians standing alongside the zebra crossing is more than five then the green signal is paused and allow to cross the road and resumes the signal in the same direction of road. Our system avoids the green signal to be shown on an empty road and saves the time of pedestrians standing there and also decreases the traffic problems in the junction. This system can be visualized practically, so that it will be much better than other systems that are already implemented in the traffic junction.

KEYWORDS: Image Processing, Coco Dataset, Vehicle Count Comparison, Zebra crossing.

INTRODUCTION:- In the existing automatic traffic controlling system timer or electronic sensors are used for each phase, which results in the wastage of time when green light is visible on an blank road. So we found that traffic congestion also occurred while using the existing method for controlling the traffic. All these limitations of traffic controlling system can be eliminated by our proposed system. We propose a system for controlling the traffic light by using Image Processing. The vehicles and pedestrians standing alongside the zebra crossing in traffic junction are detected by using Image Processing through images instead of using any electronic sensors. This system shows the green signal to the side which have more density of

vehicles. Image processing is an excellent method to control the state changes of the traffic light. So this technique helps to decrease the traffic congestion and avoids the time being wasted by green light on an empty road. It is also more reliable in estimating vehicle presence because it uses actual traffic images for processing. It can also visual practically, so it functions much better than those systems that rely on the detection of vehicles.Image processing is a method to enhance raw images received from cameras placed on space probes, satellites or pictures taken in normal in day today life for various applications.Image processing is a form of signal processing and the input used is an image and the output is an image or an asset of parameters related to that image.The image is treated as two dimensional signal and applying standard signal processing to it is involved in most of the image processing methods. This project deals with efficient real-time traffic light controlling as compared to the present scenario.

RELATED WORK

In "Density Based Traffic Signal Control using Arduino and IR Sensors", paper proposes to control the traffic light by using Arduino and IR sensors. The programming of this system is already fixed, so this system proposes the implementation by Arduino with IR sensor because sometimes the normal lights are also absorbed by IR sensor which results into the improper functioning of this system. This system is helps to reduce vehicle delays and stops in the traffic signal and estimated using the traffic parameter.[4] In "Intelligent Traffic Management using RFID Technology", the paper proposes the tracking of vehicles present in the traffic junction by using RFID and can operate in real-time by improving the traffic flow and safety. It is fully performed automatically. The hardware used in the existing system can monitor vehicles at a road distance of 80-100m. Programming of RFID devices are really time consuming. [5] In "Intelligent Traffic Signal Control using Wireless Sensor Network", wireless sensor networks are used to discover the presence of traffic congestion in the junction.After that by checking the traffic density at each direction, the green signal is shown to the direction which have more density of vehicles. This system also uses a microcontrolbased algorithm for controlling the traffic congestion. [6] In "Intelligent Traffic Signal Control System using Embedded System", paper proposes the implementation of traffic signal control by using a hardware kit, servers and a database which is maintained by using MySQL.In this system k means clustering algorithm is used for the implementation. The vehicle count taken by the IR sensor is used as the input of the system. After estimating the vehicle count, the time ranges for the green signal is provided.[7]

METHODOLOGY

In this proposed system, vehicle classification and vehicle counting are the key modules that serve as a base for almost all the use cases built for effective traffic management. In the vehicle classification and counting, first the vehicle is classified, then counting is done based on the vehicle type. Counting and detection of both vehicle

and people is done through Image Processing as follows: Firstly, moving objects foreground masks are extracted from the foreground background subtraction technique. Then to identify blobs, morphological operations are applied to get the close contours, once the blobs are identified. In the object management module, Object enrolment and maintaining of the confirmed and unconfirmed list of objects are done. Tracking and prediction of the object positions are carried out, after enrolling of the object. Using these tracked objects, counting is done by using the Coco dataset.Common Objects in Context (COCO) is a large-scale object detection, segmentation, and captioning dataset which contains images, bounding boxes and labels. Vehicle counting at four directions are done simultaneously using multi-threading.Multithred process on a single processor can switch execution resources between threads, result in concurrent execution.Shared-memory multiprocessor environment, each multithreaded thread process can run on a separate processor simultaneously and resulting in parallel execution.Once counting of vehicles are completed then the number of vehicles in the four directions are compared each other. The direction which have more number of vehicles will be displayed with green signal. Simultaneously, the camera takes the image of pedestrians standing alongside the zebra crossing. If the number of pedestrians are above five, then the green signal is paused and allows them to cross the road in 8 seconds. After that the green signal gets resumed and allows the vehicles to pass and so on.

Hardware Requirements: • Two Raspberry Pi 3 • Two Pi • Two Webcams • LED's – green, yellow, red Software Requirements: • Coco Dataset • OpenCV library

EXPERIMENTAL RESULTS Once, the number of vehicles at each side is calculatedand compared, then the green light is shown to the direction with maximum number of vehicles one by one and in-between the system checks for the pedestrians ready for crossing the road and allows them to pass by pausing the green signal. If thecount of vehicles to a particular direction is

1. Greater than 40, then show green light for 40 second and red light to rest of direction.

2. Greater than 30 and less than or equal to 40,then show green light for 30 second and red light to rest of direction.

3. Greater than 20and less than or equal to 30,then show green light for 20 second and red light to rest of direction.

4. Greater than zero and less than or equal to 20, then show green light for 10 second and red light to rest of direction. And if the number of pedestrians is above five, then the green light is paused and they are allowed to pass in 7s. 2

CONCLUSION

This project presents the traffic light controlling using Image Processing. This is done by using the camera images captured from the road and each image is processed separately and count the number of vehicles in the road. Here we also implemented a safe passage for the pedestrians through zebra crossing in the direction where green signal

is provided.This mechanism helps the pedestrians to save their time.In automatic traffic control system, the use of timer had a drawback that the time is being wasted by green light on the empty road. This technique avoids all the limitations of the earlier used traffic control techniques. So that, our system demonstrates that Image Processing is far more efficient than the traditional techniques.

REFERENCES

[1] Alisha Janrao, Mudit Gupta, Divya Chandwani, U.A. Joglekar, "Real Time Traffic Density Count Using Image Processing", International Journal of Computer Applications, Volume 162 - No. 10, March 2017.

[2] Pallavi Choudekar, Sayanti Banerjee, M.K.Muju,"Implementation of Image Processing in Real Time Traffic Light Control", IEEE Computer Society, 2011 Frontiers of Information Technology.

[3] S.Lokesh , T.Prahlad Reddy, "An Adaptive Traffic Control System Using Raspberry PI",International Journal of Engineering Sciences &ResearchTechnology, ISSN: 2277-9655, Scientific Journal Impact Factor: 3.449 (ISRA), June 2014.

[4] Shubham Sahu, Dipanjan Paul, S. Senthilmurugan, "Density Based Traffic Signal Control using Arduino and IR Sensors", International Journalof Novel Researchand Development, Volume 3, Issue 4, April 2018.

[5] Vijayaraman P, P Jesu Jayarin, "Intelligent Traffic Management using RFID Technology",International Journal of Recent Technology and Engineering, Volume 08, Issue 04, November 2019.

[6] Vignesh Viswanathan,Vigneshwar Santhanam, "Intelligent Traffic Signal Control Using Wireless Sensor Networks", 2nd International Conference on Advances in Electrical and Electronics Engineering, March 17-18, 2013 Dubai (UAE).

[7] SayaliAmbekar, Shraddha Jawalkar, Anagha Patil, Shweta Patil,"Intelligent Traffic Signal Control System Using Embedded System", International Research Journal of Engineering and Technology,Volume 04, Issue 02, February 2017.