A Review on Smart Traffic Management System

IOP Conf. Ser.: Mater. Sci. Eng. **1145** (2021) 012209 https://doi.org/10.1088/1757-899X/1145/1/012209

Retraction

Retraction: A Review on Smart Traffic Management System (*IOP Conf. Ser.: Mater. Sci. Eng.* **1145** 012090)

Published 23 February 2022

This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

Retraction published: 23 February 2022

A Review on Smart Traffic Management System

P Indhiradevi[1], P Saravanakumar[2], R Varsha[3], S Shahithya[3], S Naveen Prabhu[3]
[1]Assistant Professor, Department of Civil Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamilnadu, India.
[2]Assistant Professor, Department of Civil Engineering, Institute of Road and Transport Technology, Erode, Tamilnadu, India.
[3]Under Graduate Student, Department of Civil Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamilnadu, India.
Indhiradevi.P@kpriet.ac.in

Abstract. Traffic congestion could be a condition in transport where it has huge crowds, slows the speed of vehicles and even it increases the vehicular lengths. Traffic congestion on city road networks has increased rapidly, since the 1950s. When the traffic demand is great then the interaction between the vehicles reduces the speed of the traffic and finally results in traffic congestion. To overcome such circumstances in present scenario, smart traffic management system can be initiated and we are in study to find a solution to make traffic free city. This system helps in monitoring the traffic signals and flow of vehicles by means of image processing with CCTV cameras. CCTV cameras help in image processing and identifying the number of vehicles passing in the road surface. It helps in abating the traffic congestion in the road and fuel consumption of the automobiles. Sensors are used for detecting the number of vehicles and speed. By coordinating the CCTV cameras and sensors the collected information can be sent to Variable Message Sign (VMS) Boards. This board displays the information regarding traffic to the road users. It helps in diverting and altering the roads at the earliest where the waiting time is reduced. Though the waiting time is reduced, fuel is consumed automatically. Therefore, reduction in the fuel consumption helps to control the air pollution. By creating the control system and detecting the problems faced in the road, traffic congestion can be reduced and provide traffic free environment. As we face rapid growth of our country's population, smart traffic management system provides people to have smooth transportation network which would find a way to reach their destination soon and make their journey better forever.

Keywords: Traffic congestion, image processing, CCTV cameras, sensors and Variable Message Signs (VMS) Boards

1. Introduction

Traffic congestion plays vital role in day-to-day life. It is the situation where huge crowd of vehicles takes place due to improper traffic rules and also by the accidents on the road. It is mainly caused due to increased population [1]. It has been a serious problem in many cities that people have to face it daily.

Since, it has to be faced daily, and people will be affected psychologically. It also results negatively in work, education and personal life of people. Wastage of fuel and time occur regularly due to traffic congestion. This increases stress and often leads to frustration due to delay in their regular professional activity. Blowing of horns constantly leads to noise pollution.

To overcome this, we have a study in Smart Traffic Management System, it is centrally-controlled traffic signals and sensors control the traffic flow rate throughout the area. For monitoring purpose, CCTV cameras are fixed to notice the movement of the vehicles in the road. With the support of CCTV cameras, image processing can be done successfully. Image processing provides the detailed information about number of vehicles passing in the road [2]. This helps to monitor the vehicles properly without any delay. The processed image is sent to Variable Message Sign (VMS) Boards through sensor. The road users will be able to identify the path which is traffic free and can change the route. If it is done, it helps in abating the traffic congestion in the road which results in fuel consumption as it is a serious complication at present. As the fuel consumption is reduced, accordingly it controls the air pollution which comes up with sustainable environment.

2. Scope & Objective Of Project

The main objective of this project is to reduce the traffic congestion by increasing the traffic flow. This can be done by controlling and monitoring of the traffic.

a) Image processing helps in reducing the stopping time in the road.

b) It helps in regulating the movement of the vehicles by reducing traffic density.

In this project, we have a study of managing and controlling the traffic by means of CCTV cameras.

3. Selection Of Location:

Traffic in Annur, Coimbatore is heavy in peak hours due to congested roads. This affects the passengers by increasing the travelling time. Due to increase in travelling time, passengers may be affected psychologically and it creates stress full life [3]. It results in health issue further. To overcome this, we have undergone a study in smart traffic management system to increase the road efficiency by decreasing traffic flow.

We have selected Annur, because it is a four-junction road. It connects National Highway (NH 209) Coimbatore to Sathyamangalam, State Highway (SH 80) Mettupalayam to Avinashi therefore it results in heavy traffic though it is a narrow road. In order to reduce this, CCTV cameras are fixed at every main road to monitor the vehicles. This helps in image processing so that controlling and monitoring can be done easily [4].

4. Study Of Literature:

Literature review is done for traffic management system using control system, SCAT and SCOT, Raspberry Pi, TRANSYT and VISSIM micro-simulation software.

In Cambridge kingdom town, for smart traffic management system they need used 3 parts like traffic lights, queue detectors and system [5]. The detectors inform that the transport system concerning the flow of traffic for each second, a model of universe conditions is used by the system to see if it would be beneficial to change the section of any of the lights on a regular basis. If arriving Flow management is

employed, the outmost sets of traffic lights on blood vessel or radial roads serve a special operate and square measure referred to as management points. The software package has been developed over many years and is now used in many European cities, including Cambridge, to coordinate traffic signals, generally to give buses priority.

According to [6], in past days the employment of fixed time traffic signal and vehicle motivated traffic signal is high. Now a day's many other techniques are used to optimize delay and to control traffic flow, adaptive traffic signal controllers are one of them to optimize Traffic signal, different types of algorithms are used to make best adaptive traffic signal controllers, different types of algorithms are highlights. By mistreatment TRANSYT traffic modelling software package for locating the best fixed-time signal arrange associate degreed VISSIM micro-simulation software package to declare and estimate the TRANSYT model and to assist appraise the best signal arrange; build an accommodative frame signal arrange and refined and evaluated the plan mistreatment VISSIM with VS-PLUS person. Through microsimulation, it may be terminated that delay within the accommodative signal management was shriveled than that within the mounted time management.

[7], aims to induce higher of hold up caused by ineffective traffic management systems that ar obsolete and work on a pre-de-fined tally. These ancient systems allot timings regardless of the particular density in traffic on a particular road thereby inflicting giant red lightweight delays. The system planned ensures traffic lights answer real time values of traffic, thereby permitting correct management of your time and resources. so as try and this, initial reason the density of traffic that is found employing a combination of unbearable sensors and image process techniques? This data is given by a Raspberry Pi, that successively controls the light indicators. additionally, to it, the data that's collected is distributed to the cloud, and might be accustomed monitor traffic flow at periodic intervals. just in case of device system failure, the values keep within the cloud will be useful in predicting the density of traffic supported long run periodic analysis.

According [8], Traffic congestion may be the worst of the scenarios seen in the cities. With rapid development, increasing population and demand for innovative services managing a city's transportation network is a complex challenge. Hence, traffic congestion on main roads tends to numerous problems such as transportation delays, accidents and air pollution. The cities need to come up with new strategies and technologies with the aim to reduce traffic congestion. Various techniques have been implemented to control traffic. However, Advanced Traffic Management System (ATMS) is an effective solution for traffic management that showed potential for reducing traffic congestion on road networks. ATMS is a intensive area of research and study within the field of Intelligent Transportation System (ITS). Smart cities that adopt ATMS solution have ability in solving traffic congestion problem by exploiting its technologies [12].

The traffic congestion can be reduced by the usage of Advanced Traffic Management System (ATMS), where the problems recognized on the study route after collecting the data and carrying traffic volume study, spot speed study and roadside interview. Traffic volume study done at the intersections paves way to determine the volume/capacity ratio and roadside interview has taken on the study route gave a suggestion about the actual traffic related problems. The capacity and level of service (LOS) of intersection can be made better by introducing Advanced Traffic Management System (ATMS). It can be a successful system for reducing congestions on study route [9]. It can upgrade the traffic situation on the highways by enhancing travelling safety, increasing the travelling mobility, enriching the system efficiency and conserving the energy and protecting the environment.

5. Methodology

Annur road connects NH 209(Coimbatore to Sathyamangalam) and SH 80(Mettupalayam to Avinashi) where it experiences a heavy traffic at the peak hour. It delays the travelling time. Since it doesn't have traffic signals for the four junction roads, the presence of traffic police is always in need. In order to reduce this, we have made a study on traffic volume, speed, origin and destination and parking. Origin and Destination are conducted to understand the pattern of movement of persons and goods at particular area during particular time. Parking study is done for estimating the amount of vehicles that can be parked in particular area. By considering the area available, parking method has to be fixed [15].

After making the study, analysis of collected traffic data should be done for the process to be carried. The analysis of traffic data helps in identifying the location for placing CCTV cameras, sensors and Variable Message Sign (VMS) Boards [14]. CCTV cameras are used for capturing the image of vehicles passing in that particular road. Inductive Loop sensors can be used for determining the speed, distance and number of vehicles [10]. Variable Message Sign Boards are used to indicate and inform about real time situation in road and traffic conditions. With the help of information gathered from CCTV cameras and sensors, image processing can be done. The information regarding traffic collected from the image processing is then displayed on VMS boards which would help road users to find their best and alternative routes for quick journey.

NH 209 is highly congested as the road is narrow when compared to another National Highway. The fixing of CCTV cameras and sensors should be noted carefully [11]. Sensors and CCTV cameras are fixed at either side of the road. In North and South direction of NH 209, both sensors and CCTV cameras are fixed and monitored continuously. Accordingly [13], in SH 80 sensors and CCTV cameras are fixed at both North and South direction. This process helps in detecting the number of vehicles passing in that particular road during particular time. By providing the proper instruction, road users can be able to adapt their feasible road. As a result, this makes a way to reduce traffic in that particular area by preferring alternate routes. Since it is a cost effective this would be sustainable for society. This ensures time saving for the road users which grant us peaceful journey as well as stress free life forever. Figure 1 shows the view of national highway.

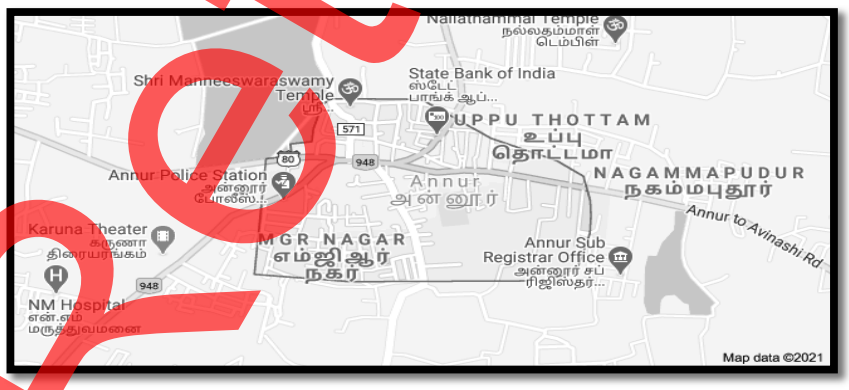

Figure 1. View of National Highway

6. Conclusion

After successful installation of this system, traffic volume is reduced about 16% in NH 209 Coimbatore to Sathyamangalam. Better results can be obtained by widening the road in future which would be more effective. The traffic in SH 80 is also declined by 20.5% as compared to early cases. This process is carried out in particular area of Annur town as the traffic is very heavy in peak hours at morning and evening. Initiating this process in every place where traffic congestion is heavy and the road is narrow gives better result in monitoring and controlling of the traffic in cost effective way. It mainly results in fuel consumption which will enrich our economy.

References

[1] A. Stevanovic, C. Kergaye, J. Stevanovic, *Evaluating robustness of signal timings for varying traffic flows*, Transp. Res. Rec.: J. Transp. Res.Board (2259) (2011), pp 141–150
[2] Naga Harsha.J, Sheena Mariam Jacob, Nikhil Nair, J. John Paul, *Density Based Smart Traffic System with Real Time Data Analysis Using IoT*, IEEE ICCTCT 2018 –**2**, 6145
[3] Amanjot Kaur, Dr. Mohita Garag Harpreet Kaur, *Review of Traffic Management Control Techniques*, IJARCSSE, **7**, April 2017, ISSN: 2277 128X.
[4] Amudapuram Mohan Rao and Kalaga Ramchandra Rao, *Measuring Urban Traffic Congestion A Review*,IJTTE, 2012, **2**(4), pp 286 – 305
[5] Rijurekha Sen, Bhaskaran Raman, *Intelligent Transport Systems for Indian Cities*.
[6] Piotr Burnos, Janusz Gajda, Piotr Piwowar, Ryszard Sroka,Marek Stencel,TadeuszZeglen,*Measurements of Road Traffic Parameters Using Inductive Loops and Piezoelectric Sensors*,Metrology and Measurement Systems, **14**(2), pp 187–203, 2007.
[7] Ashish Jain, Manisha Mittal, Harish Verma, and Amrita rai, *Traffic Density Measurement based On-road Traffic Control using Ultrasonic Sensors and GSM Technology* in Proc. of International Conference on Emerging Trends in Engineering and Technology
[8] Chandrasekhar.M, Saikrishna.C, Chakradhar.B, phaneendra kumar.p, sasanka.c,*Traffic Control Using Digital Image Processing*, International Journal of Advanced Electrical and Electronics Engineering ISSN 2278-8948, **2**, May 2013
[9] Gustav Nilsson, Giacomo Como, *On Generalized Proportional Allocation Policies for Traffic Signal Control*, International Federation of Automatic Control, **50**(1) (2017), pp 9643–9648
[10] G.Lakshminarasimhan, V.Parthipan, Mohammed Irfan Ahmed,Sri Harsha K Nvm , Dr.D. Dhanasekaran, *TRAFFIC DENSITY DETECTION AND SIGNAL AUTOMATION USING IOT*, International Journal of Pure and Applied Mathematics, **116**(21) 2017, pp 389-394
[11] Dinkar Sitaram, Nirupama Padmanabha, Supriya S, Shibani S, *Still Image Processing Techniques for Intelligent Traffic Monitoring*, 2015 Third International Conference on Image Information Processing
[12] PrakashDuraisamy, XiaohuiYuan, ElSaba,A. and Sumithra Palanisamy, Contrast enhancement and assessment of OCT images, Proceedings of International Conference on Informatics, Electronics & Vision (ICIEV), 2012 Date: 18-19 May 2012 pp.91-95(Location :Dhaka, Print ISBN: 978-1-4673-1153-3,INSPEC Accession Number: 13058449,Digital Object Identifier :10.1109/ICIEV.2012.6317381)
[13] Sumithra M. G., Thanushkodi, K. and Helan Jenifer Archana ,A. A New Speaker Recognition System with Combined Feature Extraction Techniques , Journal of Computer Science, Vol. **7**, Issue 4, pp.459- 465, 2011. (With impact factor SNIP of 0.162 and SJR of0.034).

[14] Balasaraswathi, M., Srinivasan, K., Udayakumar, L., Sivasakthiselvan, S. and Sumithra, M.G., 2020. Big data analytic of contexts and cascading tourism for smart city. Materials Today: Proceedings.
[15] Sivakumar, P., Boopathi, C.S., Sumithra, M.G., Singh, M., Malhotra, J. and Grover, A., 2020. Ultra-high capacity long-haul PDM-16-QAM-based WDM-FSO transmission system using coherent detection and digital signal processing. Optical and Quantum Electronics, **52**(11), pp.1-18.