

Optimization of Vehicle Flow in Traffic Signal on J.L.N. Marg, Jaipur

Divya Vishnoi, Prashant Kapoor, Sitaram Choudhary, Sanjay Kumar And Sumit Kumar Meena
Department of Civil Engineering
Poornima Group of Institutions,
Jaipur

Abstract- The paper evaluates the current traffic control system. The system represents variable time measurement of traffic flow in one cycle period. It also detects the optimum flow through the system and detect the real time problem into interconnected in a traffic fashion. It also represents individual traffic volume. It also analyze for solving the problem, which are faced by traffic system and also evaluate management system and technique that which are utilized in signal system. It analyze how free flows of vehicle throw disturbance or jam. The model also interpreted discrete time and peak hour traffic volume, it analyze the similar result and evaluate to show significant improvement over a traditional system. The traffic system technique is basically based on the art of electronics and control. It also explain what is the speed of vehicle for less disturbance and explain or convince the traffic system by provide the vehicle speed and interpreter signal timing. They are used easily two way or 4way system and also better for crossing one way to another way. After calculating the no. of vehicle we will also know which side traffic density is more and signal time increase or decrease depend on traffic volume. By taking data we will analyze how traffic are free flow from signals without any disturbance. If vehicle speed are between the range (40kmph to 60kmph) than they are easily flow and Green cycle time so arrange the vehicles get green signal on every signal.

Keywords- Traffic Signal, Speed, Accident

I. INTRODUCTION

In modern era life is too fast and we face different type of problem in which one major problem is traffic jam or congestion and it is increasing day by day. The main reason of traffic jam is due to high volume of vehicles, the incompetent infrastructure and improper distribution of the development. Due to increment in population, the no. of vehicles are increased which is contribute in economical growth of country.

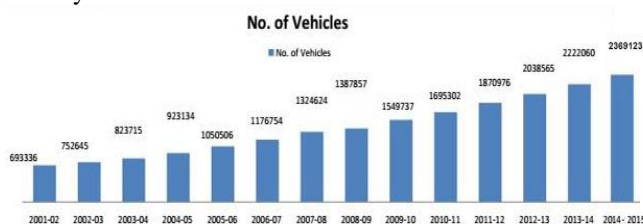


Fig. 1. No. of vehicles in jaipur ; source: Jaipur Traffic Police

The traffic congestion is also increase at slower speed, the cycle time less, longer trip times, and increase no. of vehicle. The road are generally used by vehicle but the system are designed the traffic demand. When traffic demand is more than enough, than the distance reduce between vehicles and slow the speed of the traffic system and cause the traffic congestion. when traffic are stopped in red signal for some period of time, again gain the peak velocity which they consume much amount of fuel in red signal and also to gain average speed when traffic are fully stopped for a interval or some period of time they are known as traffic jam.[1] More traffic creates frustration and tension. When the fixed time signals are used, they create the problem of jam due to variation of traffic volume in different lanes. Generally traffic signal provide the vehicle safe or easy journey and effective navigation and follow traffic rules and regulation the vehicle are easily reach to the destination. The cycle time are decide by utilize the sensor to evaluate the traffic volume strength. They are adjusted itself and it directly depend on traffic density. In present era the cycle time has been based on the interest of various researchers, but it is mainly depending on the costly sensor, for using video camera in an effective way for efficient traffic congestion estimation. Traffic control systems are responsive systems that use data from vehicle detectors and optimize traffic signal settings to reduce vehicle delays and stops. Central control room control signals. Traffic signal timings are executing according to vehicle demands.

1. Vehicle operation cost are decreasing due to reduction in delays
2. Scanty in traffic congestion along with increase in capacity of roads and intersections resulting in improvement in level of service of the road system
3. Environmental pollution is being reduced.
4. Noise level has also been checked.

Apart from this advantage, there would be indirect advantage- in the form of time savings and minimizing accidental case. Current time Signal controlling system is controlling the signals in real time and operating them automatically according to the demand in traffic. We discussed a current time traffic signal control system called as Rhodes. After investigation of urban traffic signal we have observed that a real time optimization free flow model can be more suitable. The model was modified & it has been taken into account of current traffic scenarios, the various types of vehicles in the area. The technology can be applied to a real case study also.

A Major traffic problems and their solutions are based on Many researches improving the traffic by increase or decrease cycle time. It can be control by the traffic, the use of real time data in a traffic control system to monitor real traffic flows in a network, so that traffic can be directed and control effectively. Reliable short-term control free flow models of traffic free flows are crucial for the success of any traffic control system. The current time data has been taken by adopting manually method. The paper improving the efficiency of traffic flow estimation. [2]

II. METHODOLOGY

We are adopting manual method. By taking cycle time of green signal we correct or improve the time of signal system. S of permutation and combination method for free flow of vehicles. By which we also save fuel, environmental pollution and time. We also interpret by minimizing or maximizing green signal timing for different speed. Which traffic are in queue also define how much time it take from to reach from one signal to other signal. By counting the no. of vehicles which passes in one green cycle time, and classified of vehicles mean two wheelers or four wheelers, arrange the cycle time. There are many process to capture images and count vehicles, all they have to do is process images and track vehicles. Count traffic images and focused on traffic behavior, heterogeneity among individuals and Then, they applied this manually obtained data to investigate individual vehicle movement. Three main approaches to detect moving objects in a video viz. temporal difference, optical flow and background subtraction. They method knowing the traffic density for traffic surveillance control system a neural network method for the same. developed a CCTV camera based and utilized image processing and pattern recognition methods and working capabilities of a system to monitor the road, initiate automated vehicle system, measure speed and count number plates. Also counting vehicles through images instead of using electronic sensors placed in the pavement. We worked with a camera alongside the traffic light; taken image sequences and then image sequences analyzed using image processing for vehicle detection, and according to traffic situations on the road traffic light can be controlled. As vehicle in the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile Internet is created. So using this system can be developed that will help in controlling traffic and pass information from one vehicle to the others. Area Traffic Control System (ATCS) is an effective solution of Road Traffic, which optimizes traffic signal, covering a set of roads for an area in a city. Traffic signal control system use data from vehicle detectors and optimize signal cycle time in an area to reduce vehicles traffic. The signal control system operates in current time with a capacity to calculate maximum cycle time, and send input to traffic signal controllers with different period timings. The cycle time plans of traffic controller change automatically to reduce stoppage time, which in also reduces total journey time. The data are taken in only peak hours at morning and evening. Speed are varying so we had taken the speed 40kmph, 50kmp, 60kmph and evaluate how it free flow one signal to other signal.



Fig. 2. Traffic volume at intersection; source: Jaipur Traffic Police

The function of the Detector is to identify the presence or passage of vehicles and provide input for traffic signal control systems. Various types of vehicle detectors are easily available, but in which them, the most popular and economical is the conventional inductive loop vehicle detectors. The sensor loop is attached on the pavement consisting of different turns of wire. Metallic parts of the vehicle is crossing over the sensor loop will unbalance the tuned circuit (detector local oscillator) resulting in detection. The size, shape, and configuration of the loop vary depending upon the specific application. The loop sensors, vehicle detectors together with control electronics sense the traffic load at the junction.



Fig. 3. Map of proposed research area; source: Google Earth

The figure shows the proposed research location OTS circle and Shaheed Abhimanyu Singh Marg. The distance between both station is 850 m.

Table 1: Analysis of Cycle Time At Signal Intersection

Time	GREEN CYCLE TIME	TOTAL CYCLE TIME	NO. OF VEHICLE PASS				TOTAL NO. OF VEHICLE
	(in second)		C	CAR	BUS	BIKE	
8:00	42	150	16	2	31	2	49
8:30 AM	43	150	17	1	34	1	52
9:00 AM	47	165	19	1	35	1	55
9:30 AM	40	143	15	1	28	1	34
10:00 AM	47	167	19	2	36	2	47
4:30 PM	33	150	19	1	23	1	43
4:30 PM	46	148	17	2	29	2	48
5:00 PM	41	151	16	2	20	2	38
5:30 PM	43	151	17	1	24	0:00	42
5:30 PM	32	149	11	1	19	1	31
5:30 PM	36	151	15	1	26	1	42
6:00 PM	34	148	13	2	25	2	40
6:00 PM	37	152	17	2	28	2	47
STATION 2							
Time	GREEN CYCLE TIME	TOTAL CYCLE TIME	NO. OF VEHICLE PASS				TOTAL NO. OF VEHICLE
	(in second)		C	CAR	BUS	BIKE	
8:00 AM	45	127	15	1	30	3	46
8:30 AM	69	167	19	1	38	7	48
9:00 AM	78	151	25	2	43	6	70
9:30 AM	72	150	21	2	40	6	63
10:00 AM	64	149	19	2	36	5	47
4:00 PM	56	129	23	2	39	7	64
4:00 PM	49	147	19	2	33	4	54
5:00 PM	62	150	21	1	41	7	63
5:00 PM	53	140	18	2	38	6	58
5:30 PM	40	152	15	1	31	3	47
5:30 PM	53	150	20	2	36	5	58
6:00 PM	52	147	21	1	34	0:00	56
6:00 PM	46	143	13	2	31	5	46

Table 2: Analysis of time taken by vehicles from station-I to station-II

Speed (Kmph)	Total time taken (Sec)
40	77
50	62
60	51
Vehicles in queue (Assume at least 100 m)	
40	95
50	80
60	70

III. RESULT AND DISCUSSION

Time taken to reach one station to other stations will varies with vehicle speed. If vehicle are in lane or queue then its initial velocity 20kmph and queue length 100meter then time consume to reach to first station an after its velocity is 40,50,60kmph.

Length of queue is equal to 100 meter and speed 20 kmph, time taken to reach signal is 18 seconds. The correct time is 44 seconds.

IV. CONCLUSION

By increasing or decreasing the cycle time of green signal the vehicle can flow freely from every signal without any disturbance. It will save the fuel, reduce pollution our environment, time saving, less traffic jam and also minimize the case of accident. As the green cycle is varying time with the vehicle density at both traffic signals. That indicates proper planning of traffic flow. Different scenario assessed in this work indicated that time elapsed can be reduce between two traffic signals. As maximum and minimum value at traffic signals suggested that there is a big scope to reduce the time at traffic signal. This will improve traffic free flow between two signals and also reduced the air pollution.

REFERENCES

- [1] [1] Vivek, Tyagi, Senior Member IEEE, Shivakumar Kalyanaraman, Fellow, IEEE, and Raghuram Krishnapuram, Fellow, IEEE "Vehicular Traffic Density State Estimation Based On Cumulative Road Acoustics" in IEEE Transaction on Intelligent Transportation System. Vol.23. No.3 September 2012.
- [2] MD.Hazrat ALI, Syuhei KUROKAWA, et al, "Autonomous Road Surveillance System proposed Model For Vehicle Detection and Traffic Signal Control" in Procedia Computer Science 19(2013).