INTERNATIONAL JOURNAL
OF MULTIDISCIPLINARY RESEARCH
IN SCIENCE, ENGINEERING AND TECHNOLOGY

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 5.928

Traffic Signal Designing and Analysis for Heavy Traffic Road in Nagpur

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ABSTRACT: Traditional traffic signal system only gives instructions to stop and not to vehicle driver. But if someone is breaking the signal then this system is not able to catch them and there are chances of taking bribe. Therefore, to increase the security of traffic signal and to reduce human efforts and to avoid the bribery we are introducing smart traffic signal system through this mini project. Smart traffic signal based on the microcontroller & ultrasonic sensor, in which ultrasonic sensors are placed at one side of road in such a way so as to cover particular necessary area of road from where the vehicles are restricted to pass. If the signal is red and any vehicle is breaks the signal then ultrasonic sensor detect it and microcontroller take immediately action to buzzer alarm along with camera capture the image of that vehicle. It also makes record of when, where, which vehicle breaking signals by saving image in particular folder as name of current date and time.

I. INTRODUCTION

A set of automatically operated colored lights typically red, amber and green for controlling traffic at road junctions, pedestrian crossings and round about. Fig. traffic signal light Generally Traffic is defined as the movement of a person vehicles or any type of goods or person in between the site locations, and thus includes pedestrians and all types of vehicles mechanized, motorized or non-motorized. Nagpur is at present third largest city in Maharashtra which faces traffic congestion problems mostly in the different road intersection due to rapid development of the infrastructure and increasing population. While the seven intersection the vehicles are stopping for their turn to clear the particular patch of road, on the signal point the vehicle travelers to keep their vehicle engine on so that it leads to loss of fuel and they also keep unnecessary Thus it leads to delay in vehicle & noise pollution generally increased at the signal or seven intersections. This used to reduce congestion on the particular intersections the Bus Bay is to be provided for the city buses moving on the particular patch. Today man has his own vehicles to get transport from one place to another place. The Noise pollution, congestions and air pollution and the results in ill effects to the health and frustration have become addicted now a day. In this Analysis respectively increase in demand for survey is to be taken for vehicle count and analysis is done to increase future development of Transport Network in Nagpur city. In this Traffic volume analysis is give an idea to make better planning of roads routes, flyovers and in future Metro. To reduce the environment impacts the species of some plants which absorbs air pollutants described.

II. LITERATURE REVIEW

Lee et al. (2012) developed a real-time crash prediction model by taking total travel time and crash potential reduction. The study result indicated the variable speed limit could reduce crash potential by 5-17 %.omchainuek et al. (2013) investigated road side safety on thai nk. The result showed that speeding vehicles were involved in roadside crashes accounted for about 70% of the total crashes and 30% of road side crashes were due to road side trees.

Zegeer et al. (1991) studied the relationship between lane or shoulder widening and accident reduction rate. He concluded that 21% reduction in accident can be achieved by widening the lane 4 feet per side.

Rio et al. (1991) studied the blood samples reports of 5745 spanish drivers killed in road accident. He found psychoactive drugs among 50.1% of those driver killed in road accidents. Mainly alcohol(43.8%), illicit drugs (8.81%) and medicinal drug(4.7%).for one every three cases (32 %) a bac (breath analyser coefficient)over 0.8g/1 was recorded, cocaine(5.2%), opiates(3.2%) and cannabis(2.2%) were three illicit drugs most frequently detected. Among medicinal drugs were benzodiazepines (3.4%), antidepressant drugs (0.6%) and analgesics (0.4%)

Hougant et al. (2011). Investigated hospitalized drivers who were involved in road traffic collision in uac.a logistic model was ed using the variables like drivers denographic data, Lime, date, location, mechanism of collision, speed at collision and Sleepiness. The conclusion was sleep is uumportant factor to road traffic collision. Further they advised to discontinue driving on highways reeling sleepy especially during hunar month of ramazan. Driver fatigue is a main problem in long journey due to restlessness.

mukmed et al. (2013) studied on crash related tsibility alstruction due to fog and smoke in florida. It was found that fog smake related crashes are more likely to occur at night without street lighting leading to more severe injuries. Head-on and rear-end are common crashes in terms of crash risk and severity. These crashes are more prevalent on high speed road, undivided roads, roads with no sidewalks and two lane nud roads.

Sreedharan et al. (2010) explored the determinants use of crash helmets among motorcyclist in india. A cross sectional study conducted in kerala .the study found only 73.1% of motorcyclist were not using helmet which results more head injuries during crash in that region.

Oduro (2012) surveyed a number of accidents and found that 83% break failure result in accident. Brake ineffectiveness is due to vehicle overloading, uneven tyre pressure, incorrect brake adjustment, air in breaking system, automatic brake adjuster not working. brake fluid on lining brake failure is due to broken pipe, low brake fluid level, cracked brake drum, brakes overheating.

III. METHODOLOGY

Literature Survey

• Accidents: In India near about 4.40.123 accidents are happened per year and most of the accidents are happened at Traffic Signal.

• Deaths: In India near about 1, 34, 834 people are dying per year only because of road accidents and most of the accidents are causes at Traffic Signal

• At Every 3 minutes an Indian loses life just only because of road accidents

• Bribe taking one another big issue found at Traffic Signal by Traffic Police then how can we recognized the irresponsible people.

Time of Survey: As per to the data collection the traffic volume survey is done while the peak hours of morning and evening time. The peak hours which refers time on morning high traffic volume and same for evening (9:00 am to 11:30 am and 5:00 PM to 6:30 PM) were taken into attention for getting of the maximum traffic moving on the seven intersections. The termpeak hours defined by the number of city buses or ST, office Bus traveling people, shop owners, school and college going students majorly the maximum flow of traffic. Peak hours are the time at which traffic volume is maximum.

3.2.2: Up Flow / Down Flow: The Up flow and the Down flow of the seven intersections was recorded by manual count so that the total number of vehicles count on that road on that particular Peak hours were done respectively at in between seven intersections from Subhash Nagar to YCCE.

Counting

Manual counts are typically used to collect data for purpose of vehicle identification, on turning, travel on which direction, pedestrian on road or vehicle usage by the particular person. Manually count is to be done on the seven intersections by getting the number of vehicles Le.HMV, LMV, etc. on different days in peak hour time i.e. from 9 am to 11 am on every day.Further is the collection of data is given as up and down represents adding and getting out at the particular intersection

Data Collection Selection of Site

Fig-1: site selection Subhash Nagar sq. To YCCE

Table-1: Traffic volume on Seven Intersections from Subhash Nagar sq. To YCCE Nagpur

| Location	Side	Time	Motor cycle	Cars	Buses/ trucks	cycles/ Autos	Wrong Sides
Subhash Nagar sq	Up	9-10 am	230	39	13	38	7
	Down	9-10 am	198	32	11	42	4
Priyadarshani T-point	Up	9-10 am	414	58	25	48	5
	Down	9-10 am	260	53	18	41	3
BhagatSq	Up	9-10 am	402	58	25	48	5
	Down	9-10 am	248	53	18	41	4
Raisoni T-point	Up	9-10 am	206	32	23	42	10
	Down	9-10 am	184	29	16	37	10
IC Square	Up	9-10 am	198	28	22	36	9
	Down	9-10 am	179	25	15	39	10
Electronics zone sq	Up	9-10 am	194	25	20	34	6
	Down	9-10 am	172	23	12	32	7
YCCE	Up	9-10 am	190	23	20	33	5
	Down	9-10 am	169	20	11	30	7
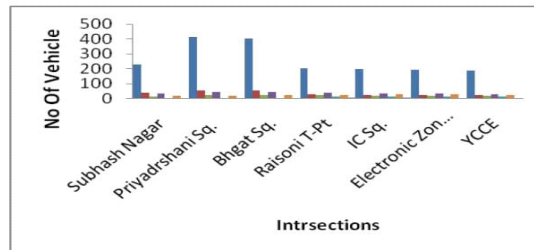
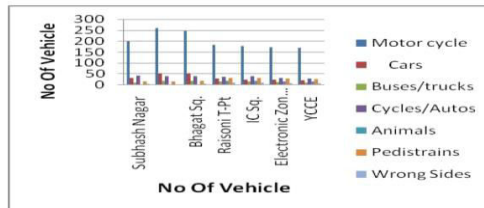**Chart-1**: Traffic flow for Upcoming on Intersection

Chart-2: Traffic flow going Down on Intersections

Traffic Noise Pollution
Traffic Noise Of Road

Road traffic noise is the most important major source of people noise especially near important road intersections with high volume of traffic of the city. The Reads are in bad condition in the country in certain region and poorly maintained and has considerable the usage of the number of vehicles travelled in particular patch of old model technology, the road traffic noise adopts much more importance

Method and Measurement:

The different parameter for the study is the Noise parameters which is the functions composition traffic, traffic flow, time and day of recording data on the morning peak hour time in morning 9 am to 11 am and same for evening from 4:30 pm to 6:00 pm. Location for the Noise parameter is same from Subhash Nagar to Ycce college.

Result of Noise Measurement:

Noise measurements were carried out in weightage in fast mode using the sound level meter 210 sound level meters. It is measured in "Db" Le. Decibel Noise levels were recorded on seven intersections on thegiven site locations during morning and evening peak hours The Noise levels at a rate of one reading per 30 min were noted. The distance of sound level meter is kept 3-4 feet from the level of the pavement surface.

$$Leq = L50 + \frac{(L10 - L90)^2}{56}$$

Advantages and Disadvantages

Advantages:

- Provide for orderly moment of traffic
- Increase traffic handling capacity of an intersection
- Reduce frequency and severity of certain type of crashes Especially right-angle collision
- Provide for continuous moment of traffic at a definite speed along a give route
- Interrupt heavy traffic at intervals to permit other vehicles or pedestrians to cross

Disadvantages:

- Excessive delay
- Increase traffic congestion, air pollution and gasoline consumption
- Disobedience of signals
- Increased used of less-adequate streets to avoid traffic signals
- Increased frequency of crashes, especially rear-end collision.

IV. OBSERVATION

Table Changes for all seven intersection of Noise level

Intersections /Time	L Equivalent(dB)						
	Subhash Sq	T-Point	Bhagat Sq	Raisoni T-Point	IC Sq	Electronic Zone	YCCE Collage
9.00am-9.30am	85.4	93.9	81.5	91.5	82.6	86.6	88.3
9.30am-10.00am	85.8	81.5	81.9	81.6	85.5	81.1	86.5
4.30pm-5.00pm	85.8	92.3	85.6	80.3	85.6	79.6	82.3
5.00pm-5.30pm	76.3	86.9	82.3	80.5	81.3	78.5	87.5
5.30pm-6.00pm	72.3	90.2	80.3	79.3	80.1	81.3	88.1

V. RESULT AND DISCUSSION

Traffic congestion is a global as well as local problem. All over the world, the major cause of traffic congestion is on street parking of the buses or any other vehicles. In Hingna Road, traffic congestion is a common issue like Nagpur city. Different infrastructural and managerial projects are granted for reducing traffic jam. However in Hingna Road this type of policy is not adopted yet. Plantation of the species it reduces the pollution.

By providing the bus bay at an intersection the congestion may be reduced Traffic congestion limitations can be upgraded by implementing various strategies such as road widening, improved road infrastructures, restricting routes for Rickshaw and hawkers, and application of Fly over, in future metro.

As per Indian standards for noise level values particularly area in city in commercial area is in between 65 dB to 55 dB for Industrial area is in between 75 dB to 70 dB and for Industrial area is in between 55 dB to 45 dB for day time and night time respectively. Average noise level of seven intersection of Subhash Nagar Square to YCC College Hingna, Nagpur city are 87.11 dB and 84.5 dB during daytime and night time respectively, which is ill effective on human health and environment

VI. CONCLUSION AND FUTURE WORK

- We have used sense in signal design which is economic compare to other methods.
- Traffic characteristics of the road can be improved.
- By doing the above measures accident rates can be decreased.
- Hence the death mortality rate can be reduced and driving would be safe on road.

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