Performance Based Congestion Control using Video Graphic Volume Count for an Uncontrolled Intersections in Vijayawada City – A Case Study

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Abstract*: The rapid changing in environment of traffic has impacted and led to the problem of traffic congestion. Vijayawada has been mentioned as a city that is developing rapidly which has caused changes in social structure extensively. The expansion area of the city has been expanded fragmentally based on basic infrastructure, the transportation infrastructure can't support the growth of economy and rapid increase in population. Due to traffic congestion many huge problems are occurring like wastage of time, accidents, wastage of money, pollution etc. To overcome all these problems congestion control measures should be adopted and we selected a corridor in Vijayawada city having uncontrolled intersections are evaluated using video graphic technique.

Keywords: traffic, pollution, video graphic technique

I. INTRODUCTION

Measures

Mitigation means reducing or decreasing the effect of traffic congestion for free mobility of vehicles as well as pedestrians. Mitigation measures are means to prevent, reduce or control adverse environmental effects of project, and include restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means.

Some of the mitigation measures have been listed below

Erection of traffic signals, road widening, converting two way to one way, constructing flyovers, alternate routes, new routes, grade separation, ramp signalling, local express lanes, reversible lanes, separate lanes for each type of transportation vehicles, building tunnels, building new outer and inner ring roads, parking facilities, reducing accidents. Banning rallies and other public gatherings near transportation facilities

Objectives

1. To estimate the basic traffic stream parameters for the selected road.
2. To estimate the condition of study road.
3. Reduce the frequency of delays at junctions.
4. To evaluate the condition of study road.
5. To design and provide the signal times at uncontrolled oversaturated intersections of selected corridor.

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Study Area

We selected a corridor at auto nagar 100 feet road of length 5.8km stretch having uncontrolled intersections starting from auto nagar gate to government hospital eluru road. In that 4 junctions are facing adverse traffic congestion problems during peak hours as there is no adoption of proper congestion control measures.

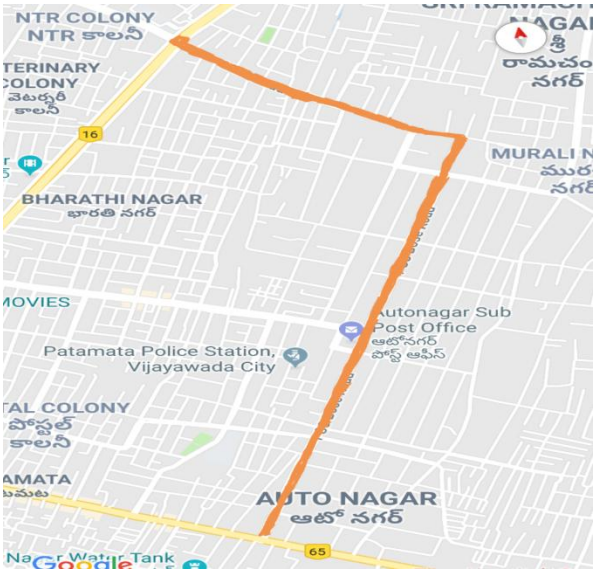

Fig1: Study Area

II. LITERATURE REVIEW

M. Vargas et.al, proposed a system for video based traffic density estimation. Successful video-based systems for urban traffic monitoring must be adaptive to different conditions. This tries to keep the simplicity and computational efficiency.

Thanes was santachat et.al, proposed a system to find the traffic density estimation with on-line SVM classifier according to the system. Traffic congestion has significant impacts on both the economy and environmental. Reducing traffic congestion can improve traffic flow, reduce travel times and environmental impact. Automatic determination of traffic congestion status is thus introduced to reduce the cost of human resource and the traffic congestion delay.

Krause et.al, have used fuzzy logic for two different kind of traffic management problem.

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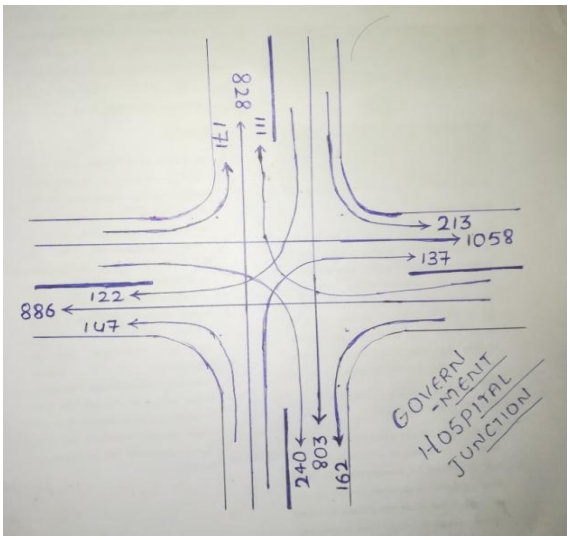
First fuzzy logic is used to take into account the uncertainties of traffic data, and to detect traffic congestion in isolated road sections. Second, a fuzzy model based traffic control approach has been introduced. The approach was also implemented in an existing traffic control system in Germany. The results were compared with the previous approach based on conventional control technology.

Gasser auda et.al, developed a mobile, bus-mounted machine vision system for transit and traffic monitoring in urban corridors, as required by intelligent transportation systems. In contrast to earlier machine vision technologies used for traffic management, which mainly rely on simple algorithms to detect certain traffic characteristics, the new proposed approach makes use of a recent trend in computer vision research, namely the active vision paradigm.

III. METHODOLOGY

Firstly we have selected a corridor which are facing traffic congestion problem at junctions during peak hours. We have collected traffic volume count at those junctions during peak periods of the day by using smart phone video graphic technique. We have the collected the data in such a way that all directions at a junction are covered.

Fig2: Autonagar pantakaluva junction



TRAFFIC VOLUME DATA:

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	523	432	359	0.5
3 wheeler	83	74	101	0.8
Car/jeep	127	179	408	1
Bus/lorry	84	87	124	3.5
Total PCU	749	759	1102	

TABLE 1: Place: government hospital junction towards benz circle

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	631	472	595	0.5
3 wheeler	97	71	123	0.8
Car/jeep	151	126	392	1
Bus/lorry	87	76	119	3.5
Total PCU	849	685	1204	

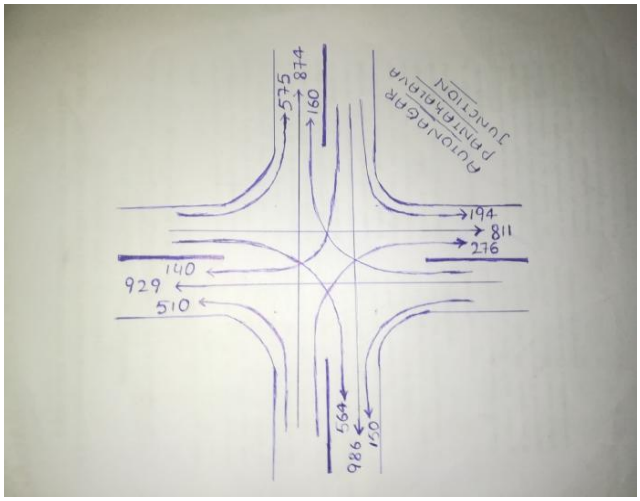
TABLE 2:Place: government hospital junction towards ramavarapadu ring

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	539	621	1100	0.5
3 wheeler	61	41	79	0.8
Car/jeep	172	121	257	1
Bus/lorry	57	43	81	3.5
Total PCU	690	615	1154	

TABLE 3: Place: government hospital junction towards: auto nagar 100 feet road

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	591	723	1371	0.5
3 wheeler	76	53	89	0.8
Car/jeep	212	239	374	1
Bus/lorry	41	47	79	3.5
Total PCU	712	807	1407	

TABLE 4: Place: government hospital junction towards: dental hospital



TRAFFIC VOLUME DATA:

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	1624	1477	1536	0.5
3 wheeler	173	113	134	0.8
Car/jeep	424	370	403	1
Bus/lorry	67	47	53	3.5
Total PCU	1609	1363	1464	

TABLE 5: Place: auto nagar pantakaluva junction towards: kannuru junction

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	1127	953	1056	0.5
3 wheeler	149	104	137	0.8
Car/jeep	392	290	401	1
Bus/lorry	59	47	52	3.5
Total PCU	1281	1014	1221	

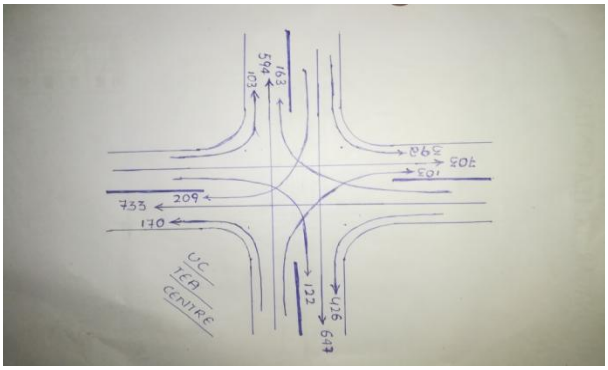
TABLE 6: Place: auto nagar pantakaluva junction towards: auto nagar gate

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	1396	1242	1293	0.5
3 wheeler	190	135	173	0.8
Car/jeep	473	360	425	1
Bus/lorry	73	66	82	3.5
Total PCU	1579	1320	1497	

TABLE 7: Place: auto nagar pantakaluva junction towards: auto nagar 100 feet road

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	1769	1536	1642	0.5
3 wheeler	178	123	161	0.8
Car/jeep	502	459	531	1
Bus/lorry	49	52	61	3.5
Total PCU	1700	1507	1694	

TABLE 8: Place: auto nagar pantakaluva junction towards: ntr circle



TRAFFIC VOLUME DATA:

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	823	1177	1278	0.5
3 wheeler	173	129	157	0.8
Car/jeep	297	333	293	1
Bus/lorry	38	47	65	3.5
Total PCU	980	1189	1285	

TABLE 9: Place: auto nagar uc tea centre towards: auto nagar 100 feet road

Type of vehicle	8am to YUH9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	798	1092	892	0.5
3 wheeler	127	170	189	0.8
Car/jeep	258	344	290	1
Bus/lorry	37	37	48	3.5
Total PCU	888	1156	1055	

TABLE 10: Place: auto nagar uc tea centre towards: auto nagar / kannuru

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	891	1014	939	0.5
3 wheeler	120	87	147	0.8
Car/jeep	193	240	251	1
Bus/lorry	39	47	61	3.5
Total PCU	871	981	1052	

TABLE 11: Place: auto nagar uc tea centre towards: eluru road

Type of vehicle	8am to 9am	1pm to 2pm	5pm to 6pm	PCU
2 wheeler	1021	828	931	0.5
3 wheeler	127	93	107	0.8
Car/jeep	297	234	301	1
Bus/lorry	58	42	67	3.5
Total PCU	1112	869	1087	

TABLE 12: Place: auto nagar uc tea centre towards :ESI hospital

IV. CONCLUSIONS

Estimated the physical condition of the junctions. By considering the present situation of the junctions by taking traffic flows into consideration we have more number of conflict points which leads to accidents at junctions. By taking all factors into consideration the required mitigation measures for the study area at junctions are:

- Signalising of junctions at 1^{st},2^{nd},3^{rd},and 7^{th} junctions
- Widening of roads at 1^{st},2^{nd} junctions
- Curtail right movements at 5^{th} and 6^{th} junctions

V. FUTURE SCOPE OF STUDY

In India traffic volume counts are taken by toll gates, giving contract to companies etc. This type of methods are uneconomical. To solve these problems smartphone video graphic technique is one of the best method for taking volume counts at uncontrolled intersections which is economical and gives accurate and effective values.

In present situations of Vijayawada city due to rising in population at a rapid rate the vehicles in the roads are more. So the traffic data collected changes time to time. So it is very difficult to depend on previous year traffic data. It is very uneconomical.

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