



Traffic Problems: Smart and Innovative Solution For Metropolitan Areas

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Abstract —The aim of this research is to know traffic congestion problems that are affecting the pace of travelling in our daily life. Although the government is trying harder to decongest up to certain level but only marginal relief is found regarding one of the serious problem of Traffic congestion that is rising as each day passing. Here we will discuss and find simple, sensible, smart and innovative solutions which could be applied in near future to give some major relief to the commuters around the world especially in Australia.

Keywords- Traffic Problems, Traffic Snarls, Smart Solution, Innovative Approach, Traffic Congestion.

I. INTRODUCTION

In 2015 there were 18.0 million vehicles that were registered on the government website, in 2016 there was annual rise of 2.2% in vehicle and further in 2017 it rose to 18.8 million vehicles with the annual growth rate of 2.6% year-on-year. This figure suggests that annual growth of vehicles in Australia are rising at a high rate there by demanding upgradation and building existing road infrastructure. Further, it signs that traffic condition could worsen in some parts of the city and improving the traffic network is the need of the hour.

Here we have discussed some of the challenges that causes the traffic queue also discussing the best possible outcomes to avoid such situation. To address the above challenges, we looked across the globe to find feasible solutions. For this, we reviewed some of the articles regarding intelligent and smart traffic solution from the various countries like Dubai, Japan, China, India and America. Some of the techniques and system can be used and implemented to the major cities of Australia i.e., Sydney, Melbourne and Brisbane.

Further, the importance has been given to the mass transportation and interconnection of various modes of transportation, linking with each other for the convenience of its travellers. Sustenance of a city and country very much dependent on the how well common people of that city or country is used to travel in public transportation. Transportation system should be developed so good that even a private car owner should consider taking public transport and should leave his/her owned vehicle at home. Thus, we can say that multimodal transport should be accessible as well as affordable to reach to the last mile or unprivileged section of the society as well.

Given below are few highlights of the research proposal that we came across as one of the life changer initiative if implemented by the government or City Council and would benefit the commuter world at large with much ease and convenience.

II. BACKGROUND

If you can name one common problem all over the globe, it is the traffic congestion problem which the whole world is facing unanimously including Australia. It is one of the major problem of rural, urban and suburban parts.

III. LIST OF DIFFERENT RESEARCH FROM VARIOUS COUNTRY

Nowadays, every mega country having their own traffic solution. We studied some of the traffic solving techniques from major countries of the world such as:

- In Dubai, they are using solution like mass transportation and road & utility work. As per the research carried out from the Dubai contraction company they always preferred to work during the night time which will help them to avoid public disturbance.
- In United states of America, the prime method used is On road parking prohibited, flow less chain signalling and upgrading road design as per the need and rising population.
- In India, they are using the smart screen traffic LED display which shows the data of following signal traffic; so, rider can avoid that route and find alternative way.
- In japan and china, due to high population rate in this country they have special facility for pedestrian. They built a bridge for them for crossing the road, which will beneficial to rider and pedestrian.

IV. AIM

- The main aim of this research is to avoid traffic problem in Australia's major cities like Brisbane, Malborne, Sydney by implementing this technique.

V. OBJECTIVES

Here is the list of objectives mentioned below:

- To make key metropolitan areas of Australia free from traffic by 2025.
- To achieve this mega task, it is advisable to implement various traffic solution which are feasible should be implemented at first.
- Prohibition of on road parking should stricter rules with the immediate effect to decongest traffic problems in crowded areas, failing to do so high fines could be made on the users who violate it.
- Real-time transportation facility could be available for passengers, to avoid unnecessary waiting problem at transport station.
- Transportation hub should be made in high concentrated precinct.

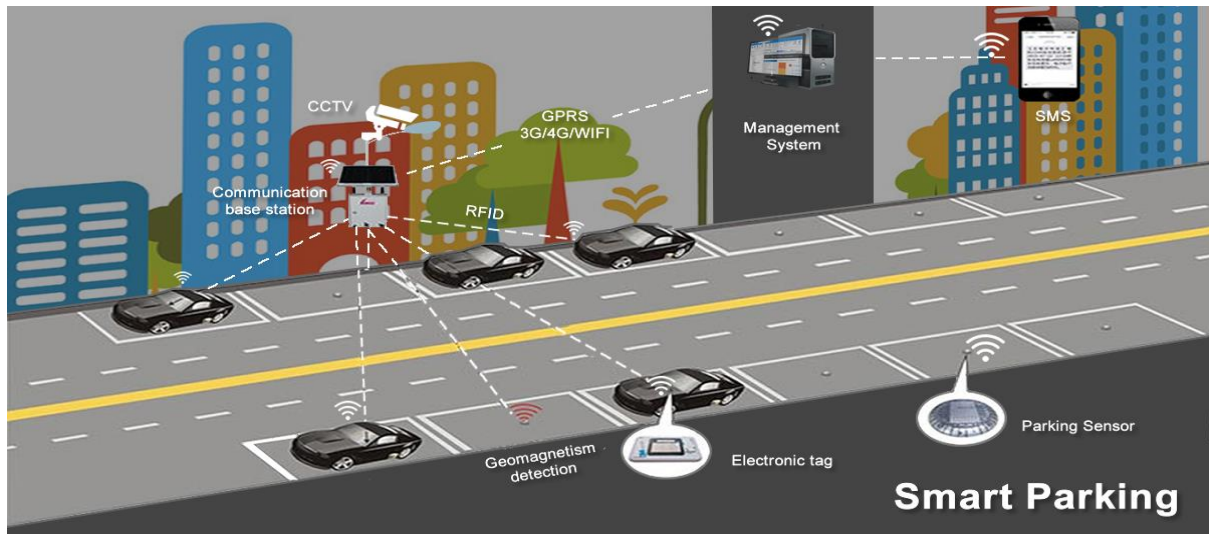
VI. TRAFFIC PROBLEM AND SOLUTION

1. ROAD DESIGN

I. Problem: Sometimes the roads are not designed properly, are one of the main cause of traffic problems. In small town, there may be the case that illegal encroachment has been done on either side of the road so enough width of road is not available for commuters thus adds to the traffic troubles.

II. Solution: It is mandatory to estimate the vehicle carrying capacity of each road and time and again road capacity of vehicles should match it. Also, the uniform by-laws should be there across the country and illegal encroachments should be removed to give extra lane of road to its users in either of direction.

2. PROHIBITED PARKING ON THE ROAD

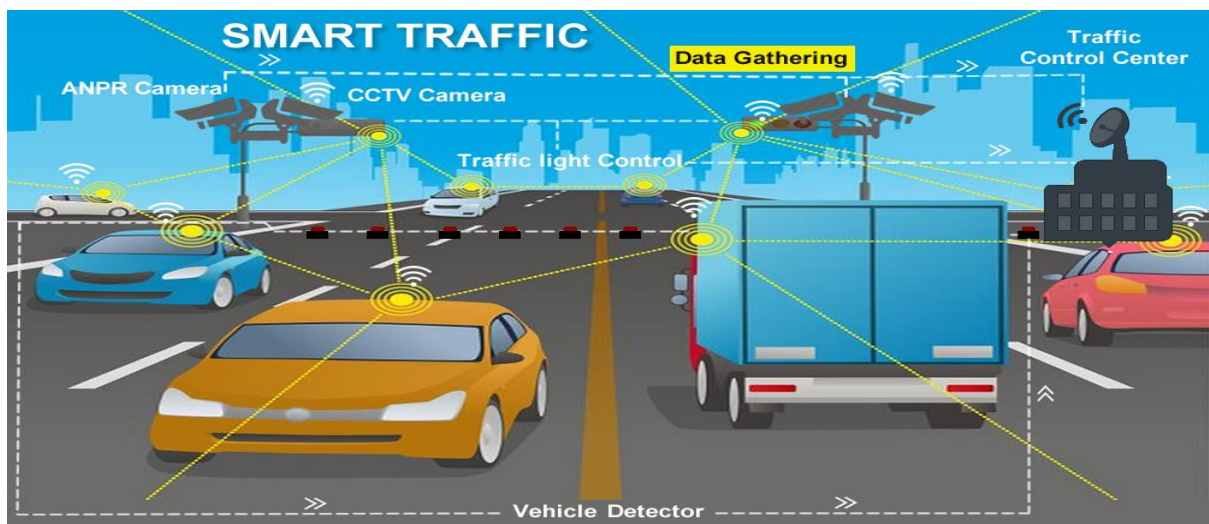


Problem: This is another huge problem that should be addressed in major cities and towns. We may see that there is series of cars is parked alongside the road. In this case the city council might have designed the road according to requirements but because people are parking vehicles illegally, there is reduction of no of lanes in each direction from 33% to about 50% in one way. This adds to the trouble and frequency of traffic snarls can be increased substantially.

Solution: It is the responsibility of City council and state government to give dedicated space for parking for certain no of hours on the busiest roads like CBD of the City, shopping malls, restaurants wherein huge people are coming. In the places such as Sydney, Melbourne and Brisbane where land is not available for parking, here council can make a multilevel parking where at one place about 750-1000 cars can be accommodate in the given time.

As shown in the above figure. The concept of how smart parking can be applied in the city level is mentioned. Basically, it works on smart parking sensors which will detect whether the space is available for car or not via geomagnetism detection of electronic tag on the car. It will communicate the traffic management by sending current information through Wi-Fi or 4G network. Further this information can be send to a commuter's mobile phone in form off SMS or app notification, this will result in easily access for the car parking in the public premises.

3. SMART SIGNALING



Problem: We are using traditional signalling system in almost all part of the Australia, where there is signal cycle consisting of RED, YELLOW and GREEN lights turns on and off. Here sometimes happen that at a junction, the time of signal for major and minor road are almost same, if not very marginal difference. But when comparing to actual no of vehicles passing through that road and signal cycle for major and minor road, we can find that even if there hardly any vehicles passing while the signal is on for minor road, majority of the time the road is completely vacant.

Solution: In some parts of Asia, the signals are developed in a smart way. Signal cycle here are decided on the sensor that has been added to detect the vehicle capacity. In such case when there is a very heavy traffic flow from one direction at a junction, the sensor will detect the density of vehicle and will automatically increase the normal signal cycle to up to 1.8 times. In other case, if the vehicle is quiet less comparing it with its average, the signal cycle can be short to half of the time of regular cycle. This experiment has been successfully done in countries like Japan and China and it could be implemented in major cities of the Australia too on experimental basis. This system will reduce the problem of inadequate green lighting. The above figure shows similar kind of model which can be very helpful to manage the system traffic more efficiently.

4. ROAD AND UTILITY WORK

Problem: We have seen many times that utility work, road construction and road resurfacing work goes on during day-time which causes diversion at some of the stretches. With such diversions, the commuters might have to partially vacant the road.

Solution: It is advisable to do any kind of utility work on road should be done preferably in the night time, so people and vehicular movements are not affected at large.

5. TRAFFIC PROBLEMS AT JUNCTION AND AT BOTTLENECK

Problem: Sometimes the road is narrowed for certain stretch where widening is not possible. Such phase of the road is bottleneck where traffic halts for few minutes or even an hour.

Solution: In such cases, if it is feasible to construct an underpass or overpass, it could solve problem for future traffic congestions. Another solution is to make one-way route instead of two-way as it will double the available space for vehicle in one direction and we could divert the vehicles to another road and after the bottleneck, we can again merge it as well.

6. LACK OF MASS TRANSIT SYSTEM

Problem: In a city having large trading and economical centre mass transportation system acts as a boon. If sub-urban areas are overloaded by the traffic flow and density and for such region mass transportation is inevitable.

Solution: Mass transportation is the only feasible transportation in highly density areas or cities. Mass transportation is the prime solution to traffic chaos and affordable for its passengers too. For Ex During Gold-Coast CWG 2018, because of mass transportation modes like G-Link Trams, Buses and interconnecting such transportation service just acts catalyst helps athletes as well as spectators commute very easily to the Games venues. Further this transportation was also linked to Train service at Helensvale which links to Brisbane city and Brisbane airport. This ultra-modern facility and linking multimodal transportation was one of the reason for the success of such huge event.

7. TOO MANY PEDESTRIANS CROSSING

Problem: Pedestrian movement plays a vital role in managing traffic. Some junctions which are surrounded by University, School, Shopping complex or entertainment surroundings have huge pedestrian movements. Junction or roundabout around such regions are affected by the over pedestrian movements so commuters might not able to permit to turn left or right and so could be waiting for the next round.

Solution: In such problem, the council can develop exclusively pedestrian skywalks, that could solve the commuter's problem to cross the road obstructing the vehicular traffic thus traffic jams could be avoided by building necessary infrastructure.

8. FLOWLESS CHAIN SIGNALING

Problem: This problem arises often when on a stretch of road, there are many junctions at a regular interval of 500m to 1000m. for ex, continuous 5 junctions are there and after 1st and 2nd junction you need to stop at every junction which is quite annoying. This short distance signals tend to create a traffic mess which is very tedious task.

Solution: Here we could design the feasible vehicle speed and should project the signal system in such a way that at constant designed speed, if a car moves towards 1st signal and tends to pass series of consecutive 5 signals, he can get green signals at every junction till 5th junction gets over, and vice versa from the opposite end as well. This would synchronize the traffic flow in a very efficient way.

9. CAR POOL OR SHARING TAXI

Problem: Now-a-days our level of comfort has increased subsequently. This had led to the personal commuting vehicle to majority of the commuters that have good source of income. Even if the two employees or 2 people are travelling to same place also living in the same premises, they won't share a vehicle or taxi with each other. For ex, if 4 people are going from the same region to same place, chances are high that each of these will have their own vehicle, this not only adds pollution but only rises the traffic problems in some the vicinity.

Solution: There is a very simple and pocket friendly solution which is Carpool. If we consider the above example, they can share one car between four people, this will not add the burden to road traffic and will reduce the environmental pollution by up to 75%. Another solution is that they can hire a cab and can share the taxi charge by 4 persons. This is also an economical solution that people can use it. It is just the matter of understanding, that will drive the future to long way with each other.

10. INFORMATION TRAFFIC SYSTEM

Problem: One constant problem commuters are facing throughout their journey is that they cannot predict the following traffic condition while standing at previous junction and this sometimes adds the traffic congestion if there's already a traffic movement problem in the coming-up junction.

Solution: JICA and AMC started a pilot project in Ahmedabad, India wherein they implemented a traffic monitoring sensor, and attached it to the giant digital display screen. In half of the portion they could display current weather and traffic condition at the following junctions. They also suggest the alternative route if the traffic is fully blocked. They used the signal light colour technique to display the condition of traffic i.e., Red colour shows Traffic congestion is at peak, Yellow colour shows that there is manageable traffic and commuters can move ahead without facing much hurdles and Green colour light shows that commuters are good to go and journey would be quite smooth ahead. In other half portion of the screen they used to advertise locally, and the revenue generated from it was used in to operation and maintain the system.

VII. RESEARCH METHODOLOGY

This Research Information will be conducted by Quantitative research approach. this methodology of research will help to analyse the critical problem and their solution as discussed earlier. for this method local public interview, news article surveys on traffic problems and other secondary research were being use. the use of smart traffic solution will promote people to use the alternative method to avoid traffic.

1. Quantitative Data Before gathering the data, it is important to find the root of the problem. for this research all the information should be conducted by the following sources.

1.1. Local people Local People are the most important root for traffic who are regular facing the problems. their review and the suggestion are highly appreciable for choosing the method.

Further, local people are divided into number of part:

- (a) Pedestrian: Sometime during the business hours so many people are crossing the roads. but due to short of time for crossing the road either pedestrian must wait longer or rider gets delayed
- (b) Local shop keeper: Some time due to road constriction shop keeper should suffer a lot; in terms of monitory problems and client dissatisfaction.

2. Qualitative Data Nowadays, every country using some specific techniques to aware the public for the traffic. for example, radio, news channel and news articles.

- (a) News channel /articles: - various country which having advanced technology with live coverage are keep updating the news, as per the current scenario of the areal traffic. Which help public to take an alternative route.
- (b) Survey system: - Some county such as Dubai, United states of America conducts a survey for traffic during specific interval. This survey gives a data on traffic control system of area, based on this data, they plan an appropriate Method to solve the traffic problem.

VIII. DISSEMINATION OF FINDINGS

Publishing of this study is important as the findings will benefit not only commuters that use their vehicles for travelling, but also the whole ecosystem who need to go out of their home for personal work or learning. The whole population of region will get direct access to modern facilities which will be developed as plan of vision 2025. This will enhance the standard of living of peoples as well as the safety of people too. Moreover, this finding will not be burden on environment, instead mass transportation will give some relief to the environmental pollution. The time has arrived to take qualitative action for the protection of mankind.

The intention of this study is to have it published in the Journal of Traffic Engineering.

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