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STUDY OF INTELLIGENT TRANSPORTATION SYSTEM WITH REFERENCE TO ROAD TRAFFIC MANAGEMENT IN PUNE CITY

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ABSTRACT
Road Traffic congestion and managing the increasing traffic is a big problem all over the developed cities in India. In India, the main cause of road traffic problems is due to slow growth in road infrastructures as compared to growth in number of vehicles. As a result, there is increased traveler time, property as well as human life damage and environmental pollution.
Intelligent Transportation System (ITS) provides possible solutions to these problems with the help of recent technologies. ITS is an integrated system that provides a broad range of communication control, vehicle sensing, and electronics technologies.
In this paper, we have studied various ITS application in Pune City with reference to road vehicle traffic. It will lead to the gaps in the knowledge which can be studied in future. This study highlights the conclusions extracted from the studies of different ITS applicationsand also propose the future scope in the field of ITS.

1. INTRODUCTION

India is the second largest populous country in the world. India, as a fast growing economy, it is seeing huge traffic congestion problems in its developed cities. Any type of congestion on roads ultimately leads to financial losses resulting in the growth of any city. With inadequate space and funds for the construction of new roads, and the growing imbalance between traffic demand and transportation resources; it is increasingly obvious that countries must move beyond the traditional model of just building roads infrastructure to solve traffic problems [2] Pune is set to become one of the largest cities in India, but its plans to solve road congestion aren't helping. Pune is amongst three Indian Cities in the Top 10 list of worst traffic conditions in the world. [14] The ranking is arranged based on a combination of factors including the average time spent by a commuter, traffic index and overall inefficiencies in the traffic system.
With the vehicle density of 753 vehicles per 1000 people, traffic that does not seem to move on city's road is a common picture. Absence of mass transport is main cause of the traffic mess. As the lifestyle and financial condition of the citizens living inPune is increasing, more people are purchasing private vehicles and preferring to travel by their own vehicle. The population of Pune, Pimpri-Chinchwad and adjoining cantonments has already touched 55 lakh and is expected to grow one crore by 2030. [15] Major roads with heavy traffic jams daily are Ganeshkhind Road, Pune Ahmednagar Road, Karve Road, Pune Solapur Road and Pune Satara Road. Around 40 flyovers have been built in various parts of the city but the city is not moving in solving its traffic problems.[13]

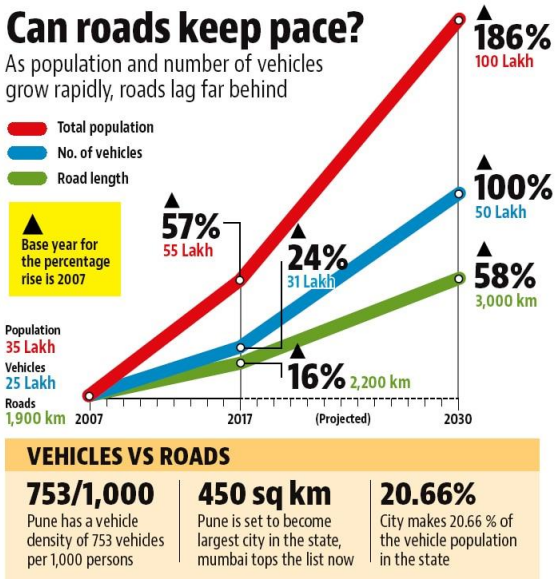

Fig. 1 Vehicle Vs. Road

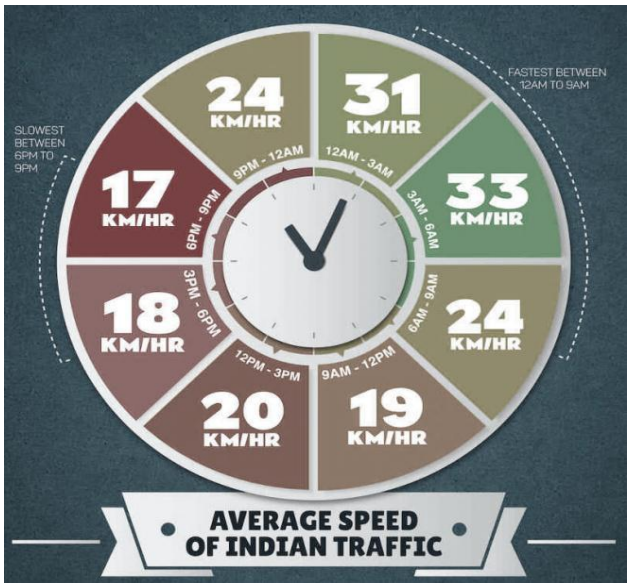

Fig. 2Average Speed of Indian Traffic

ITS is an integrated system that provides a broad range of communication control, vehicle sensing, and electronics technologies. ITS can provide solutions to different problems related to Road vehicle traffic management. ITS proves to be useful in following manner:

a. A better managed Road vehicle Traffic

b. Reduced traffic related deaths and injuries
c. Improved mobility for people and freight, including greater access to public transportation.
d. Reduced traffic bottlenecks allowing for better planned, quicker and cheaper travel.
e. Greater compatibility of surface transportation with the environment.

2. ITS Applications

In Pune City, existing ITS applications in Road vehicle traffic management are as follows:-

- Traffic Signal Control: - At different intersections, traffic is managed with the help of traffic signals. Deciding the different signal cycle and the split of Green signal time as per the flow of crowd is basic application in traffic management.
- Emergency Management:- Identifying locations of accidents or vehicle breakdown is important to handle the emergency situation and avoid traffic congestion.
- Rainbow BRT:-Rainbow BRTS is a bus rapid transit system in the twin cities of Pune and Pimpri-Chinchwad. The Rainbow network in the Pune Metropolitan Region will be more than 90 km, providing rapid, "Rainbow'' mobility to more than 7 lakh commuters by next year.
- Vehicle classification:- The single road is shared by different types of vehicles viz. 2 or 3 or 4 wheelers motorized or non-motorized vehicles. So roads are lane specific including pedestrian friendly footpaths.
- Parking Place Management:-Getting information about the parking places in advance helps individuals fo parking their private vehicle.
- Monitoring:- Close Circuit Television (CCTV) cameras are installed at major signals for close monitoring of Road Traffic situation. CCTC surveillance system is set up at traffic signals and the cameras are linked to the main control room. Pollution and road quality monitoring are also monitored through sensors installed.
- Revenue collection:- Toll taxes for infrastructure maintenance and fines for rule enforcement are collected. In a new development, Traffic Challan option is live on the website to pay for E-Challans obtained for violating any kind of traffic rules.
- Historical Traffic Data:- Long term data helps to plan new infrastructure , calibrate traffic signal times, add public transport etc.
- Public Transport Information:- Information about the arrival of public transport helps in choice of travel modes and reduces wait delays of commuters. Many public transport and fleet companies have GPS installed in their vehicles for real time tracking.
- Congestion and Travel time estimation:- Global Positioning System (GPS) helps commuters in route selection.

Pune joins Amsterdam and Berlin sites in showcasing TomTom's technology and engineering excellence in the area of navigation, maps and traffic which can help pave the way to smarter mobility in the city.

3. Key Benefits of ITS

The main purpose of the ITS is to provide the public safety and save environment. Some of the key benefits of using ITS are given below:

a. Public Safety

The main purpose of using ITS is to provide public safety on roads. In the road accident, people are not only dying due to collision of vehicles but also affect on pedestrians. In year 2017, around 450 people are died on road accidents amongst which 122 were pedestrians. So to avoid or get guided before any incident to happen, the ITS play important role. ITS will guide us through an alert about traffic or congestion ahead so that user may act accordingly.

b. Environmental Benefits

Another benefit of using ITS is to increase environmental benefits. The sensors are installed along the road side to record temperature, humidity and other environmental factors. The user subscribed to this activity can get the alerts about the environmental condition.

c. Enhancing Mobility and Convenience

ITS can be enhanced in satellite based vehicle navigation and various other application which can provide real time traffic information to the user. User can check the traffic conditions before departing from their homes or office locations.

4. The Literature Survey

The literature survey brought many technologies to the notice for implementing efficient traffic planning andmanagement. Increasing traffic at a higher pace is proving to be a huge problem in the city of Pune. The developinginfrastructure for tackling the traffic problem has not eased the problem. Thus, there is a need for effective trafficplanning and management system for Pune city [6,9,10].There are various methods to tackle traffic such as Trafficmanagement by work flow technique, Intelligent Transport System (ITS) for Indian Cities, Intelligent BRT, ecoMoveApproach, Road traffic congestion in Developing World, BRT, Multi-agent system, and Quantitative problem approach[12]. Linear regression analysis can be used to find the passenger car equivalent values for the intersection. Videorecording can be used to determine the exact number of vehicles passing at an intersection manually [2].

5. CONCLUSION

Traffic Congestion is a major problem in Pune City. The Road infrastructure in Pune City and Traffic conditions make the problem interesting to solve. Installing the infrastructure on the Pune city roads is restricted by the space. In this paper, we have taken small efforts to put together the traffic conditions in Pune city and its management through ITS. There is a scope for evaluating existing ideas in different and challenging traffic situations, innovative new solutions and evaluate ideas in collaboration with public and private sectors.

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