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Intelligent Transport System

Mr. Rajendra Sanap, Mr. Sagar Dhende, Mr. Sangram Sakhare,
Ms. Swapnil Bodkhe, Mr. Dnyaneshwar Pawar
Pimpri Chinchwad Polytechnic

Abstract: The rapidly increasing vehicle population in India, spurred by the population boom and economic upturn lays a critical burden on traffic management in the metropolitan cities and towns of the country. The cumulative growth of the Passenger Vehicles segment in India during April 2007 – March 2008 was 12.17 percent. In 2007-08 alone, 9.6 million motorised vehicles were sold in India. Economy-induced automobile usage is complicated further by the constant influx of rural population into urban areas, thus making enormous demands on the transportation infrastructure in an overloaded region. The heterogeneity of economy and the physical limit on how much additional infrastructure a city can hold complicate transportmanagement further. World Bank reports that the economic losses incurred on account of congestion and poor roads alone run as high as $6 billion a year in India.[6]

Intelligent Transportation Systems (ITS) is an established route to resolve, or at least minimize traffic problems. ITS encompass all modes of transportation - air, sea, road and rail, and intersects various components of each mode - vehicles, infrastructure, communication and operational systems. Various countries have developed strategies and techniques, based on their geographic, cultural, socio-economic and environmental background, to integrate the various components into an interrelated system. In general, any of the ITS applications uses a Traffic Management Centre (TMC) where data is collected, analysed and combined with other operational and control concepts to manage the complex transportation problems.

1.1 Introduction:

An important metric for economic growth of any country is its burgeoning vehicle ownership. However, the indirect effect of vehicle ownership is acute traffic congestion. India has, in the past decade, seen an astronomical increase in vehicle.ownership and associated road blocks and traffic snarls in its metropolitan cities. The variety of vehicles in India – two, three and four wheelers, in addition to a large pedestrian population, complicates the situation .

The principal reason for traffic congestion in India is that the road space and infrastructure have not improved on par with the traffic. The seriousness of the problem is reflected in the report of WorldBank that estimates the economic losses incurred on account of congestion and poor roads alone run as high as $6 billion a year in India. The direct solution for this problem by improvements in infrastructure is constrained by space availability and other logistic problems. There is, therefore, an urgent need to explore and develop better traffic management options to ease traffic congestion.

1.2 Benefits:

1. As part of its programme to improve air quality in the city centre, Milton Keynes Council has commissioned a fleet of electric buses.
2. Provision of on-line information to buses, trains, and their passengers creates a better informed traveller and operator.
3. Electronic ticketing enables faster, easier travel by public transport, and provides management information leading to benefit.
4. Creation of traffic-free zones and Low Emission Zones in cities reduce pollution and premature deaths.
5. Integration of vehicle systems with mobile communications and advanced mapping technology gives a potential UK fuel saving of 14%, or up to 2.9 million barrels of oil per year.
6. “Smart motorways” improve traffic safety as well as capacity Environmental monitoring
Device.[1]

1.3 Advantages and Disadvantages of ITS

Advantages	**Disadvantages**
1.Improved safety	Difficult to use in mixed traffic
2. Better traffic flow	Its equipments costly
3. Increased business activity	Preliminary difficulties in understanding
4. Better planning information	The control software could be hacked by hackers

1.3 Scope:

Rapid, exhaustive and accurate data acquisition and communication is critical for real-time monitoring and strategic planning. A good data acquisition-management-communication system combines tested hardware and efficient software that can collect reliable data on which to base further ITS activities. The different ITS hardware/equipment commonly used include sensors, cameras, automatic vehicle identifiers (AVI), GPS based automatic vehicle locators (AVL), and servers that can store huge amounts of data for meaningful interpretation. A few of the state-of-art, critical components are described below.

a. Sensors
b. Automatic vehicle identifiers (AVR) and automatic vehicle locators (AVL)
c. GPS

1.4 Statement of purpose:

Intelligent Transportation Systems (ITS) is a tested route to mitigate traffic congestion problems. ITS can be broadly defined as the use of technology for improving transportation systems. The major objective of ITS is to evaluate, develop, analyse and integrate new technologies and concepts to achieve traffic efficiency, improve environmental quality, save energy, conserve time, and enhance safety and comfort for drivers, pedestrians, and other traffic groups [4-6]. An overview of ITS can be schematically represented as shown in Figure 2. State-of-art data acquisition and evaluation technology, communication networks, digital mapping, video monitoring, sensors and variable message signs are creating new trends in traffic management throughout the world. The synergy of data acquisition, analysis, evaluation, and information dissemination helps in developing an all-encompassing system of traffic organization that enables information sharing among the managers and users of traffic.[(2)]

1.5 Operations and Maintenance:

Operating advanced systems requires a high level of integration among existing systems and agencies. [(9)]

1. Deployment of new systems places an additional burden on existing operations and maintenance personnel, who already have responsibilities and may already be overloaded. These personnel must then deal with conflicting priorities.
2. When new systems are deployed, it is not always clear who is to have responsibility for operating and maintaining them.
3. Operating advanced systems requires new skills and capabilities, which may not exist in atraditional transportation agency. This creates a need to train existing personnel and/oradd new personnel.
4. Maintaining ITS technologies requires a high degree of technical proficiency, withspecialized skills and expertise. Again, this necessitates training of existing personnel
and/or hiring new personnel.
5. Deployment of non-standard devices and systems can create an operations and
maintenance headache, with non-standard interfaces, additional training requirements, and excessive spare parts requirements.[(4)]

1.6 Classification of IST based on the positioning:

- Vehicle level
- Infrastructure level
- Co-operative level
- Advanced traffic management system(ATMS)

- Advanced Traveler Information system(ATIS)[3]

1.7 Issues and challenges of ITS in India:

Some of specific actions required to meet the challenges to ITS in India include:

1) Evolving a national ITS standard for different ITS applications and their components.
2) Setting up a national ITS clearinghouse that documents all ITS projects with details on the design, implementation, lessons learned/best practices, and cost-benefit details Centre of Excellence in Urban Transport, IIT M Intelligent Transportation Systems.
3) Developing a national ITS data archive.
4) Developing models and algorithms suitable for ITS implementations.
5) Fostering more interaction between academia, industries and governmental agencies to generate more interest and in turn projects in the ITS area.[5]

1.8 Case study:

Bhakti shakti chowk

Name of Work - Construction of Grade Separator and Flyover at Bhakti - Shakti Junction, Nigdi.		
LUMP SUM		
Sr. No.	**Description**	**Amount**
1	Flyover	36,05,85,511
2	Vehicular Overpass (Akurdi)	9,96,66,550
3	Underpass	20,45,32,039
4	PUPs - 4nos	1,43,73,640
5	Rotary and Ramp	35,15,43,866
	TOTAL	**103,07,01,605**
SCHEDULE B		
Sr. No.	**Description**	**Amount**
1	Service road	6,87,05,053
2	Improvement Works	2,64,19,901
3	Water Supply Shifting	7,92,01,988
4	Drainage	70,22,026
	TOTAL	**18,13,48,968**

TOTAL ESTIMATED AMOUNT		
Sr. No.	**Description**	**Amount**
1	Total Lump sum	1,03,07,01,605
2	Schedule B	18,13,48,968
	Grand Total (1+2)	**121,20,50,573**

1.9 Conclusion:

The rapidly increasing vehicle population in India, spurred by the population boom and economic upturn lays a critical burden on traffic management in the metropolitan cities and towns of the country.[4] While India has already made a foray into intelligent transport systems in organizing traffic, more extensive and urgent integration of advanced technology and concepts into mainstream traffic management is imperative. The adoption of location and information based technologies into vehicles, infrastructure, traffic management and traveller information services have shown dramatic improvements in the safe, and efficient mobility of people and freight in USA, European nations, UK, Japan, Middle East and Canada. ITS is still in its infancy in India, with decision-makers, key planners and agencies still in the process of understanding its potential.

India's ITS cannot be entirely modelled on the existing successful ITS of other nations due to basic cultural, geographic and practical differences amongst the countries.[10] The existing concepts have to be thoroughly understood in order to modify them to fit the Indian traffic scenario. The design of an intensive ITS program hinges on the following developments:

1. Technology: The development and implementation of advanced technologies is important to the successful management and operation of ITS in India. These technologies include electronic equipments such as sensors, detectors and communication devices and application of global navigation satellite system (GNSS).

2. Modelling of Indian traffic – A proper understanding of the traffic system is important in the successful implementation of any reliable ITS systems. The existing models, developed for the western traffic conditions may not be suitable for the Indian traffic and hence there is a need to modify or develop models that can characterize the Indian traffic in a better way.

3. Supply Chain: Seamless interconnectivity of the various branches of the transportationsector is essential to provide effective, efficient and secure movement of goods and services while improving the conservation of natural resources and reducing environmental impacts such as the effects of carbon emissions.[8]

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