

## **Intelligent Transportation System**

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### **Abstract**

Interest in the intelligent transportation system comes from problems caused by traffic congestion and a synergy of new information technology for simulation real time and communications networks. Traffic congestion has been increasing worldwide as a result of increased motorization, urbanization, population growth and changes in population density. Congestion reduces efficiency of transportation infrastructure and increases travel time, air pollution and fuel consumption. Now a day's development of roads has created a new havoc which lead to the increase in the accident cases all across the world, in order to over-come from such a problem, Intelligent Transport System holds a good point.

Intelligent Transport System is designed for the urban/state/private road transport organization. The system consists of a backend and a hardware component to provide an integrated solution for the driver console unit, electronic ticking machine passenger information system amid vehicle tracking system. Intelligent Transport System provides a single solution for transport companies to schedule and monitor buses with the help of advance technologies such as GPS, Wi-Fi and GPRS. Intelligent Transport System facilitates better public transport services by considering the bus earning, public safety and security. This paper basically discusses the impact and the various application fields of Intelligent Transport System for road transportation. Also, this paper put forward the implementation of various transportation technologies that will be vital for homeland security, vehicular surveillance along with technologies that can make our ride more safe and economical.

## 1. Introduction

World population increasing at a greater pace alit crossed the digit of 7billion; simultaneously the world economy is also growing. People are used to the greater mobility and hence when it comes to mobility Transportation especially road transportation is the one which is easily accessible to everyone. There is no doubt in higher the people using the transportation system more will be the transportation conflicts (accidents), and hence there comes the demand of proper systematic demand for transportation system which is capable of handling large mass of people on wheels safely and it is made sure that it is environment friendly as well. Worldwide various societies and associations have been setup for the development of intelligent transportation system, first was setup in 1991 by US Department of Transportation: along with this several prototypes have been proposed in context for the same, only few implemented. Vehicle to vehicle communication, vehicle to infrastructure communication, electronic fees collection are some of the very popular projects undergoing worldwide. When it comes to the developing countries like India, Intelligent Transportation System is in primary stage of development. Each nation whether developed or developing, when implement the intelligent technologies the surface transportation system will be safest, economical and last but not the least Environment friendly.

## 2. Overview

Intelligent Transportation System technology can be defined as the application of information technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.<sup>[1]</sup>

ITS aims to facilitate a national multi-modal surface transportation system that features a connected transportation environment around vehicles of all types, the infrastructure, and carry-in passenger devices to serve the public good by leveraging technology to maximize safety, mobility, and environmental performance.<sup>[1]</sup>

Its covers all modes of transport and considers all elements of the transportation system- the vehicle, the infrastructure, and the driver or user, interacting together dynamically. The overall function of ITS is to improve decision making, often in real-time, by transport network controllers and other users, thereby improving the operation of the entire transport system. The definition encompasses a broad array of techniques and approaches that may be achieved through stand alone technological applications or enhancements to ether transportation strategies.<sup>[2]</sup>

ITS offers scope for integration, and some argue that it is only through integration of its components that ITS will achieve its full impact. ITS includes array of information! data depending upon the requirement of the implementation theme, and simultaneously integrating these components together to get a good “Info structure” environment for the traffic planning, control and management and boosting the system effectiveness.

ITS relies on wide range of technologies and functions such as Communications (Microwave, internet, Bluetooth), Geographical Locations, Geographical Information

System, Data acquisition and exchange, Camera system and Artificial vision, Detection and classification, In-vehicle systems and Digital Mapping.

In this paper we will discuss the potential of these transportation technologies for sustainability of environment and various application fields.

### **3. Methodological Approach**

#### **3.1 Information Collection**

In terms of information the study is principally based on online research, considering elaborated scenarios, short scenarios, research publications and projects goals which are equally important for the objective of this paper because all of them presented novel ideas and interesting functionalities of ITS and Ambient Intelligence in the future world.

#### **3.2 Problem Identified**

Based on various literature available, the problems are identified they are logically placed in three Clusters: 1) Lack of Traffic Management System 2) Homeland Security System and Vehicles Operation 3) Vehicle to Vehicle Co-ordination and implementation of new technologies

##### **CLUSTER 1: Lack of Traffic Management System**

Traffic management system is meant to handle large mass of traffic efficiently, but due to presence of large crowd of vehicles the complexity of management system increases and these systems somehow fails to handle the crowd., which results in decrease in mobility, reduced fuel consumption, higher travel time and pollution.

##### **CLUSTER 2: Homeland Security System and Vehicle Operation**

Homeland Security System and Vehicle Operation refer to the security and surveillance on the traffic system and vehicles. It helps in keeping the track on the trip of vehicle and real-time identification of vehicle and driver driving the vehicle. The problem identified is that there is no such efficient has been developed.

##### **CLUSTER 3: Vehicle to Vehicle Co-ordination and implementation of new technologies**

This cluster is most important from the point of implementation of ITS, vehicle to vehicle coordination refers to the onboard information regarding the nearby vehicle: this would facilitates in collision control, coordinating them on the basis of the trips planned by the driver. Implementation of new technologies is rare in developing countries. Here the problem identifies is that there is no such technology implemented for public transportation system even though the technologies are available.

The ultimate solution to these clusters is provided below:

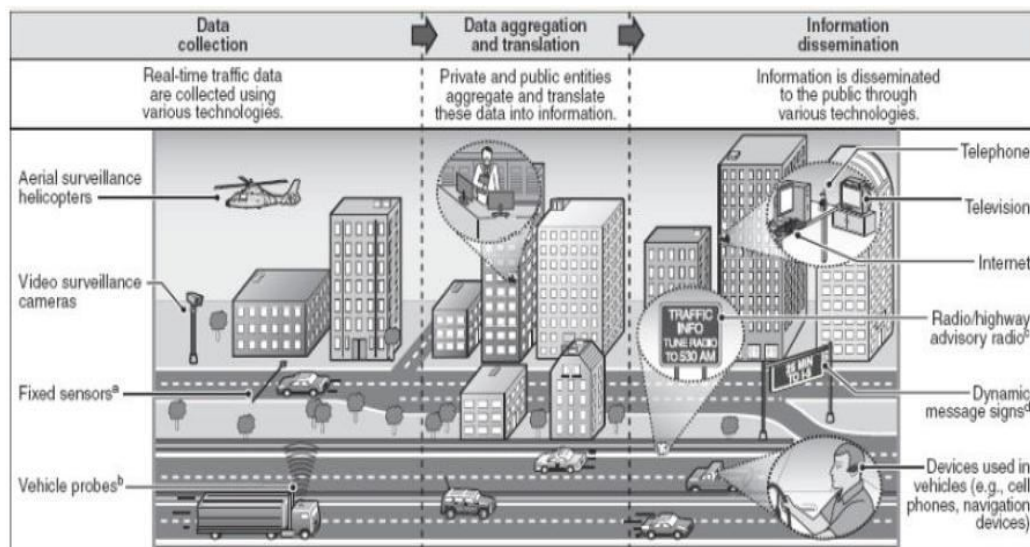
#### **3.3 Proposed Solution**

The solution to the clusters can be described as:

*SOLUTION to Cluster 1:* This clusters deals with the traffic management system. Hence the proposed solution to this cluster is implementation of properly programmed traffic management system, that means by implementing the GPS, GIS & Remote sensing , the congestion in particular route can be easily known and hence the route can be diverted. Digitalizing and centrally controlling the traffic system, will lead to efficient and economical mobility along with sustainability to the environment.

*SOLUTION to Cluster 2:* This cluster deals with homeland security system and vehicle operations, the proposed solution to this cluster is implementing the wireless communication network with the vehicles and infrastructure by creating an “info structure” environment: this would enable to keep each vehicle on track, by giving each vehicle a unique identity digitally. Hence within the blink of eyes the vehicle record would be on screen: this system would also enable to identify and know the previous trips of vehicle.

*SOLUTION to Cluster 3:* This cluster deals with vehicle to vehicle coordination, the proposed solution is implementing the wireless communication network between the vehicles by using Bluetooth, wifi, various sensors etc: this would enable vehicles to be in contact with each other, and hence collision will be eliminated.



**Figure 1:** How Real time ITS works.

#### 4. Critical Appraisals

Intelligent transportation system holds an important point in reducing the conventional cultural problems. There are also the merits and demerits of implementation of intelligent transportation systems. Intelligent transportation when used efficiently it does optimum use of road, traffic and travel data, continuity of traffic and freight management, road safety and security, integration of vehicle and infrastructure, reduced travel time, increased fuel economy, and hence environment sustainability is achieved. Along with such merits there are also demerits of this system. the system

failure will lead to stoppage of the vehicular movement, vehicle and passenger data security is of major concern.

## **5. Social Acceptance**

Needless to say that the project should be accepted by the citizens of the city as they are the intended users and the patrons of ITS. Their acceptance of ITS is Critical.

Citizens should be educated about what they expect from The project and what are the end benefits of ITS. This should be done in earnest line educating public and quashing rumours is a time consuming task

## **6. Technologies to be implemented for Environment sustainability**

When it comes to environment conservation, various transportation technologies which is must have to be adopted such as:

### **6.1 Electronic Road Tolling**

This would enable in reduced waiting time, increased mobility and reduced fuel consumption.

### **6.2 Advanced Driver Assistance System**

This would increase the safety of vehicle mobility, driver would be assisted on demand irrespective to time for any situation and hence the emergency time can be tackled easily.

### **6.3 Human machine interface onboard**

This would enhance and involve the human with the intelligent transportation system, and there will be much interactive way of communication between human and machines.

### **6.4 Vehicle to vehicle communication system**

This would lead to safe understanding between vehicles and infrastructure and increase mobility based on the knowledge of surrounding infrastructure.

## **7. Conclusions**

Implementing the use of Intelligent Transport System will definitely be going to affect our ride in a good way. Information Services remain fundamental to passenger satisfaction, which will encourage use of public transport and reduce the use of personal vehicles. This significantly contributes to saving the environment from heavy vehicle pollution and reducing congestion on city wads. At the end we conclude that I.T.S. holds a good point in providing us a good, safe journey.

**References**

- [1] "Intelligent Transportation System standards program strategic plan for 2011-14" by B.Christie,Ann D.,San G., Suzanne s. , R.I.T.A., US Dept. of Transportation (FHWA-JPO-11-052), page 6,7,21
- [2] "its handbook" world road associations, page 1,4,6,67,81.