

## INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & MANAGEMENT INTELLIGENT TRANSPORTATION SYSTEM

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### ABSTRACT

Over the years, traffic volumes on roads have increased considerably. Henceforth, traffic congestion continues to worsen producing longer commute times, increased energy consumption and air pollution, besides robbing people of a precious commodity-their time. Intelligent Transportation Systems (ITS) have emerged as a worldwide solution to handle these problems. Like any other transportation system, building a good intelligent transportation system requires considerable planning and financial resources. Developed countries like USA, Canada, Japan, UK, Australia and Germany, which have embarked upon ITS, do not have scarcity of funds and framework. But developing countries, which face considerable financial and framework constraints, require ITS user services, which are cost effective, efficient and compatible with the present level of development in the country in the related areas. This paper tries to explore the existing ITS and possibilities for further applications of ITS in these countries. This paper shows the present scenario of india traffic management and we can implement this applications of transportation to develop the technology in india . where using this ITS every problem can solve ,regarding from traffic to environmental issues and most important we can reduce the accedintal rates in india for better development of society and country..

**Keywords:** ITS; intelligent transport systems; ATIS; advanced traveller information systems; information technology; traffic engineering; developing countries.

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## I. INTRODUCTION

### 1.1 What are Intelligent Transportation Systems (ITS) ?

The application of advanced sensor, computer, electronics, and communications technologies and management strategies – in an integrated manner – providing traveler information - to increase the safety and efficiency of the surface transportation system.

### 1.2 Brief Introduction To Intelligent Transportation Systems (ITS):

Traffic congestion has become one of the greatest problems on today's highways. The majority of congestion is caused by non-recurring incidents. If the number of non-recurring incidents could be reduced or cleared sooner it would help alleviate congestion as well as improve the overall safety of the transportation network. Intelligent Transportation Systems (ITS) is a set of tools that allows technology to improve the efficiency and safety on roadways by providing agencies the ability to "see" the current traffic conditions and manage the roadway system in real time. This is greatly beneficial when dealing with an incident. It allows agencies to visually evaluate the incident and determine the necessary equipment and personnel needed without having to physically be at the site and quickly dispatching the proper response equipment and staff, thus saving time and, more importantly, lives.

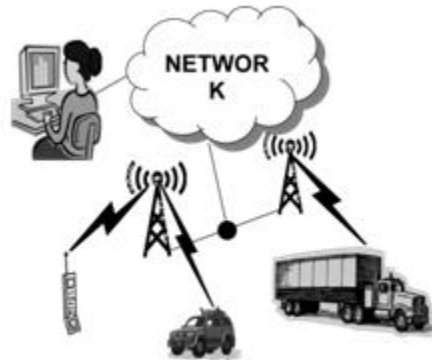
In addition, any ITS deployment is able to improve the transportation system's efficiency and effectiveness for both providers and consumers of transportation services. By monitoring what is occurring on the system, making adjustments when needed, responding to unexpected traffic patterns or incidents, and providing real-time information, travelers may adjust their use of the system or adjust their routing to reflect current conditions.

One example of the benefits of ITS and incident management can be found in Calculating Benefits for NAVIGATOR: Georgia's Intelligent

Transportation System by Michael Presley, which is a study that was conducted by Georgia DOT to determine the benefits of their ITS system. The NaviGator system consists of Dynamic Message Signs (DMS), Closed Circuit Television (CCTV) cameras, vehicle detectors, signal control system, electronic payment collection, and various other ITS field devices.

ITS ( Intelligent Transportation Systems):

- Relies heavily on vehicle communication systems including peer-to-peer and peer-to-base station communications
- Incorporates seamless integration of in-vehicle networking with existing wireless telephony
- Uses networks of collaborative vehicles to optimize traffic flow and provide dynamic routing capability (“intelligent network”)



## II. THEORETICAL ANALYSIS:

### ➤ Main Objectives :

- to improve traffic safety
- to relieve traffic congestion
- to improve transportation efficiency
- to reduce air pollution
- to increase the energy efficiency
- to promote the development of related industries

### ➤ APPLICATIONS OF Intelligent Transportation Systems (ITS):

1. ATMS
2. Advanced Traveler Information System, ATIS
3. Advanced Vehicle Control and Safety System, AVCSS
4. Advanced Public Transportation System, APTS
5. Commercial Vehicle Operation, CVO

#### 1. Advanced Traffic Management ATMS :

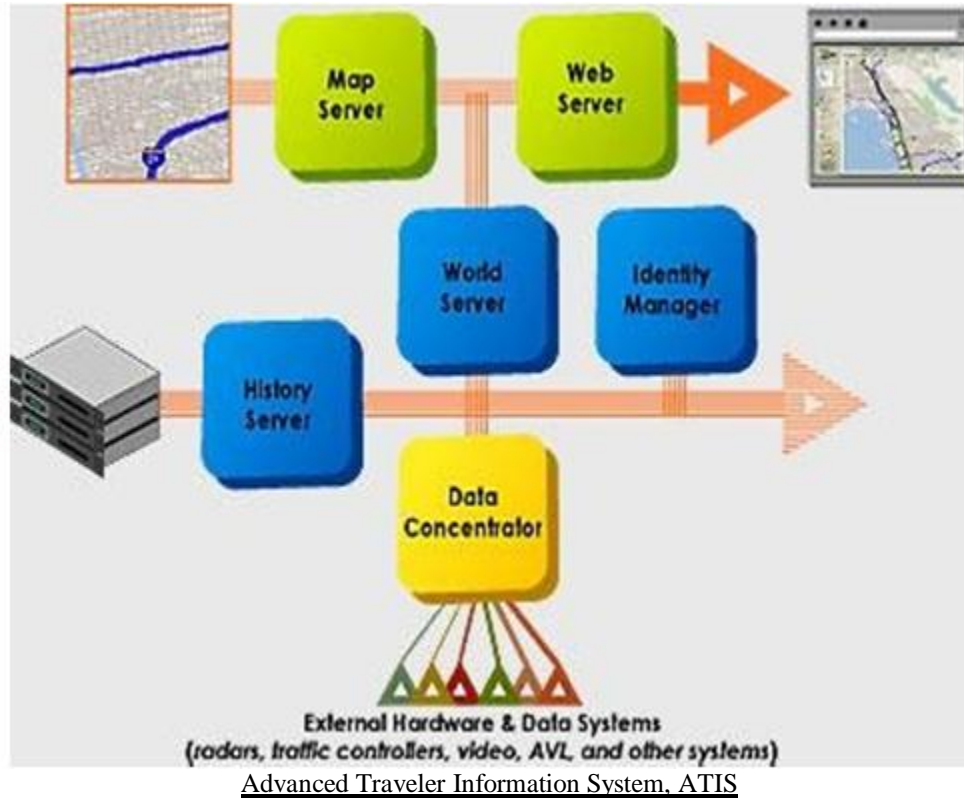
- ATMS detects traffic situations, transmits them to control center via communication network, and then develops traffic control strategies by combing all kinds of traffic information. Furthermore,

- ATMS makes use of facilities to carry out traffic control and transmits the information to drivers and concerned departments, and implements traffic management measures, such as ramp metering, signal control, speed control, incident management, electronic toll collection and high occupancy vehicle control and so on

**2. Advanced Traveler Information System, ATIS :**



- ATIS, with advanced communication technology, makes road users can access real time information in the car, at home, in the office or outdoors as the reference of choosing transportation modes, travel trips and routes
- The system mainly includes changeable message signs, Highway Advisory Radio (HAR), GPS, the internet connection, telephone, fax, cable television, information Kiosk and mobile etc .

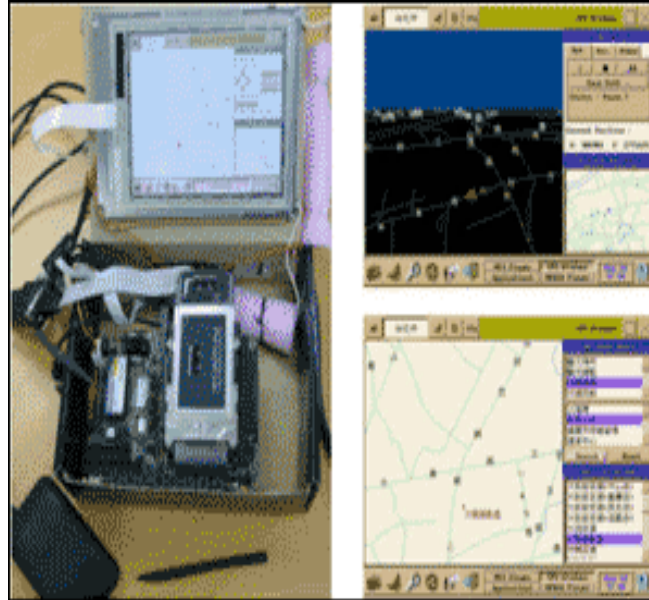


**3. Advanced Vehicle Control and Safety System, AVCSS :**

- AVCSS applies advanced technologies in vehicles and roads, and helps drivers control vehicles in order to reduce accidents and improve traffic safety.
- The AVCSS mainly includes anti-collision warning and control, driving assistance, automatic lateral/longitudinal control, and the long-run plans of automatic driving and automatic highway system.

**4. Advanced Public Transportation System, APTS:**

- APTS applies the technology of ATMS, ATIS and AVCSS in public transportation in order to improve the quality of service, and increase efficiency and the number of people who take public transportation.
- The system mainly includes automatic vehicle monitoring, VPS, computer scheduling and E -tickets.



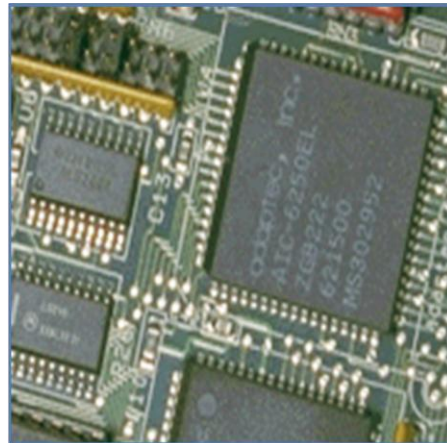
Advanced Public Transportation System, APTS:

- Commercial Vehicle Operation, CVO :
- CVO applies the technology of ATMS, ATIS and AVCSS in commercial vehicle operation such as trucks, buses, taxis and ambulances in order to improve efficiency and safety. The system mainly includes automatic vehicle monitoring, fleet management, computer scheduling and electronic payment.

➤ **Current Technology Innovation**



**Larger storage**



**Cheaper Faster processors**



**Voice/  
writing input**



**High-quality video  
and graphics**

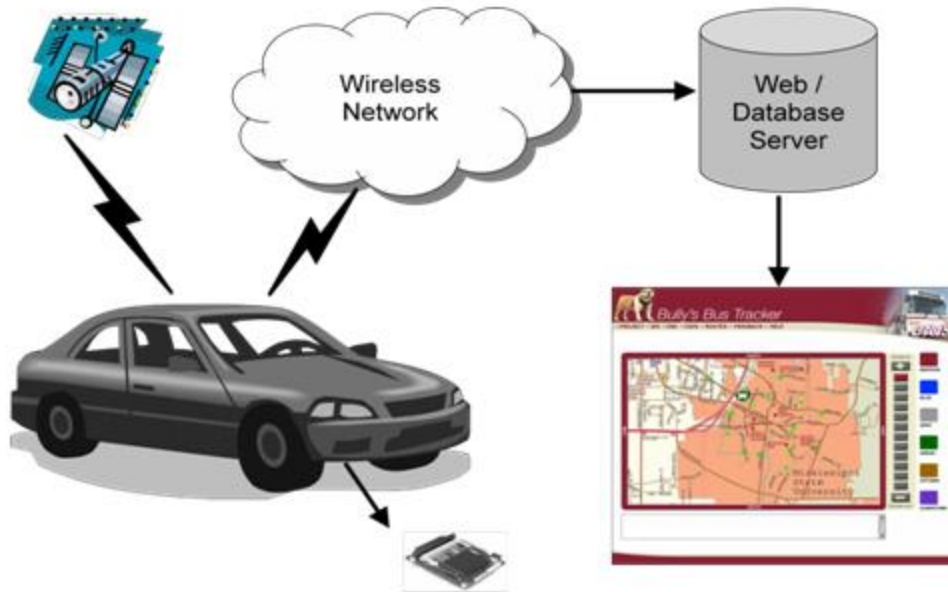
➤ **Types of Intelligent Transportation Systems (ITS ) Services :**

- **ATMS** – Advanced Traffic Management
- **APTS** – Public Transportation
- **ATIS** – Traveler Information
- **ARTS** – Rural Transportation
- **CVO** – Commercial Vehicle Operations
- **AHS/IVI** – Automated Highway Systems
- **ADUS** – Archived Data User Services

➤ **System Overview :**

• **Extensible Vehicle Performance Monitoring System:-**

- Provides vehicle performance and position tracking system to users via the Internet
- Incorporates Global Positioning System (GPS) technology for vehicle location
- Exploits capabilities of Global System for Mobile Communications (GSM) and General Packet Radio Service (GPRS)



### System Overview

Intelligent Transport Systems (ITS) provide transport solutions by utilizing state-of-the-art information and telecommunications technologies. It is an integrated system of people, roads and vehicles, designed to significantly contribute to improve road safety, efficiency and comfort, as well as environmental conservation through realization of smoother traffic by relieving traffic congestion. This paper aims to elucidate various aspects of ITS - it's need, the various user services, technologies utilized - and concludes by emphasizing the need for developing national ITS strategies.

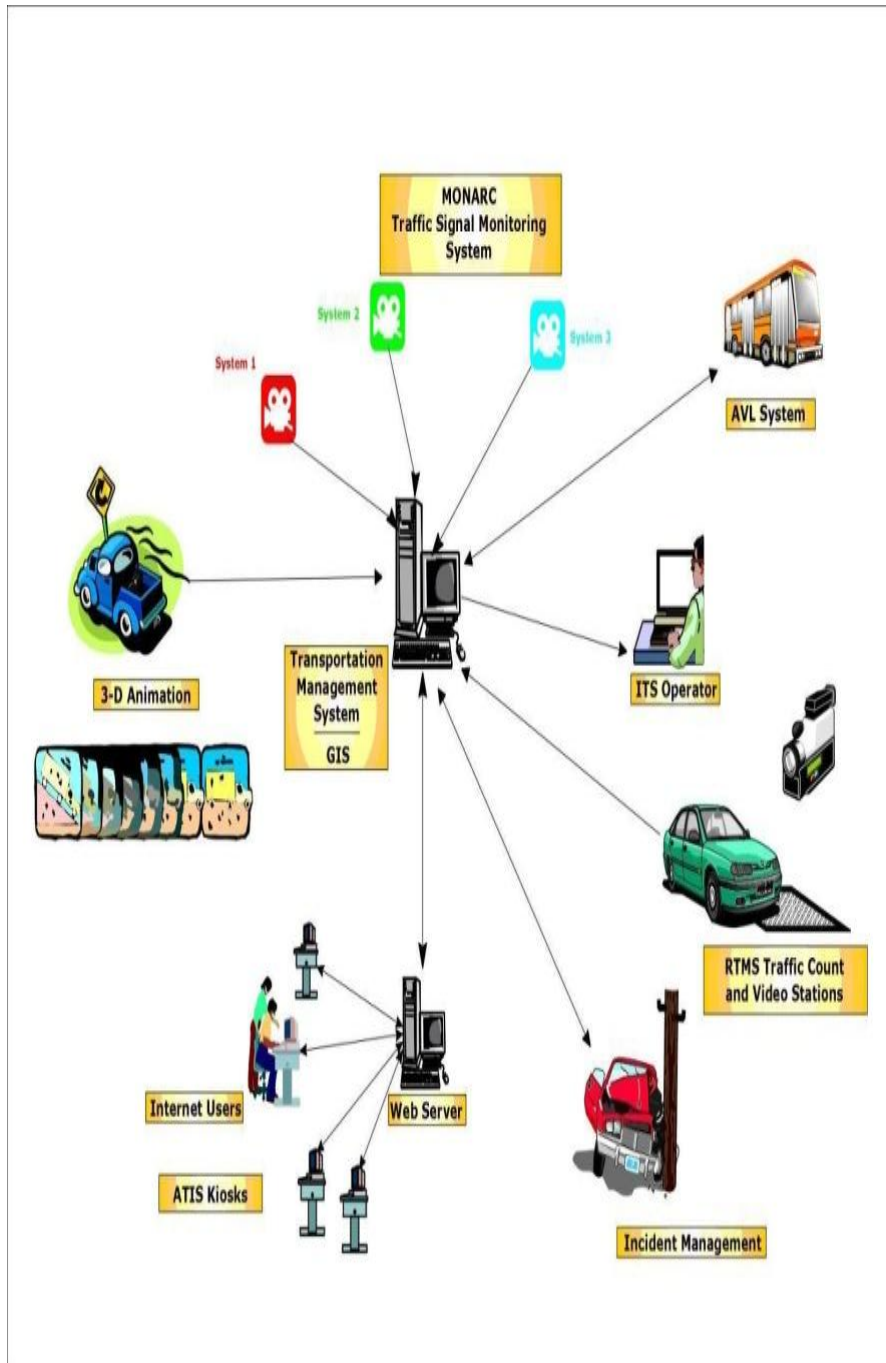
The ITS JPO is housed within the USDOT's Office of the Assistant Secretary for Research and Technology. The ITS JPO fosters the development and future deployment of connected vehicle technologies. But connected vehicle research involves all agencies within the USDOT including NHTSA, the Federal Highway Administration, the Federal Motor Carrier Safety Administration, the Federal Transit Administration, and the Federal Railroad Administration. The USDOT and its public and private partners are working to address the technical, safety, and policy challenges and are helping to create the standards and the wireless architecture that will be the backbone of the system. Connected vehicle research will leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener. If successful, connected vehicles will ultimately enhance the mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation.

#### ❖ **WHAT IS THE USE OF INTELLIGENT TRANSPORTATION SYSTEM (ITS)?**

- Operating existing programs more efficiently
- Integrating systems
- Providing travel information
- In urban areas, no more room to build highways
- Greater attention to efficient operation and management of systems
- What is new is the ability to more effectively implement these ideas
- With advances in communications and computing, it has become easier to do more with greater information, and exchange and access information easier than ever before
- Miniaturization of electronic components (Seiko watch), Affordability, Software capabilities (graphics, data processing)
- Computer and communications infrastructure
- Improving productivity through advanced technology and management techniques

- Greater emphasis and need for electronics, telecommunications, and software skills in the workforce
- Need for continuous technology training of the current workforce to keep them up to date in the world of rapidly changing technology
- Information to travelers, business, and commercial carriers
- Integration - making older systems “talk” to each other
- Give examples of each:
- Electronic Toll and Traffic Management
- -Passenger Information
- Linked Through Fiber Optics
- Based on Siemens/ACTRA
- Links to Other Sensor Elements
- GIS Links
- Opticom
- Variable Message Signs

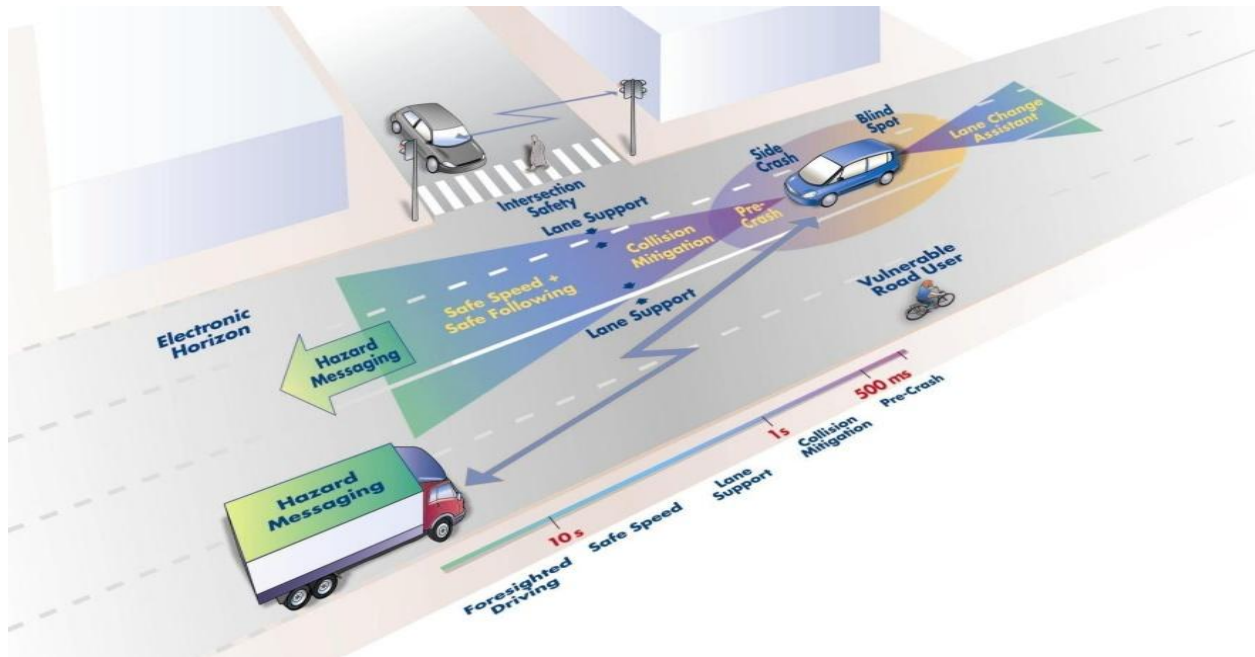




**MONITORING SYSTEM**

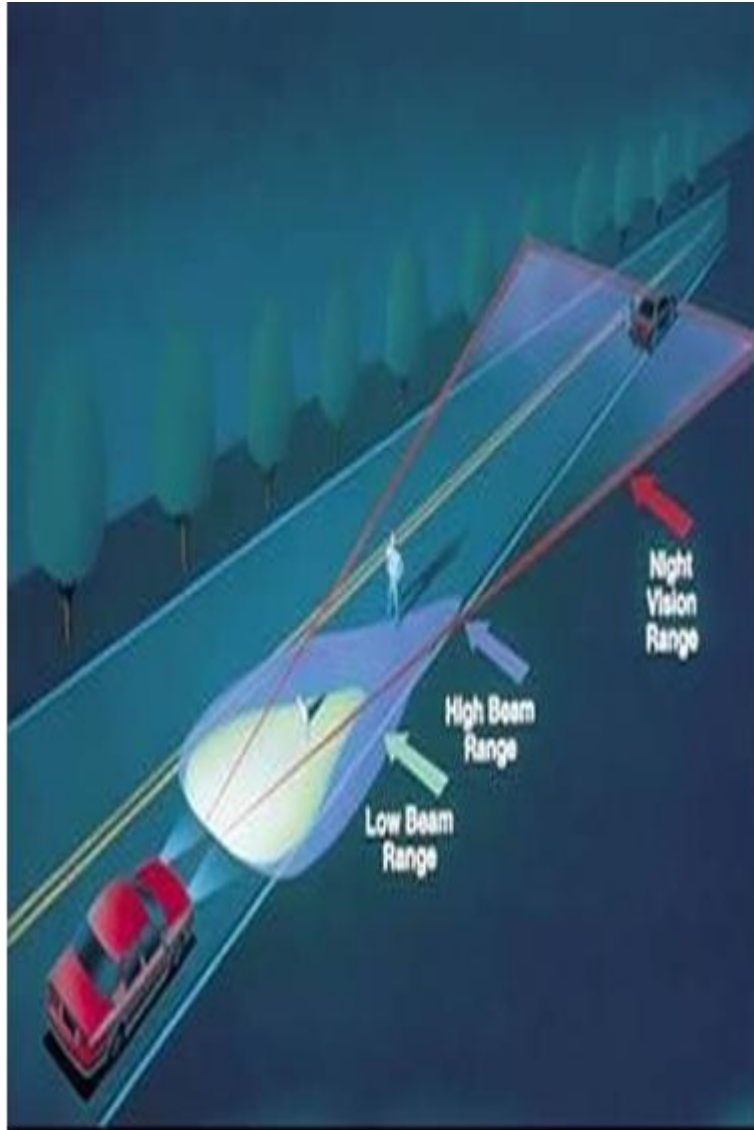
➤ **Intelligent Transport Systems (ITS):**

- On-board systems that utilise information that is received from direct sensing and/or telecommunications via the road infrastructure or other source



### Night Vision Assistance

- ITS Technologies Which Reduce Crash Risk:
  - Several ITS applications reviewed in this report appear to have significant potential to reduce crash risk.
  - The potential safety benefits for some of these systems have been determined from analytical desk top studies, whilst for other systems effectiveness data has been derived from surrogate safety measures obtained from simulator studies and short duration field trials.
  - Whilst these studies have been undertaken in Europe and in North America, the data deriving from them give some indication of the likely effects of the various systems.
  - For some systems no effectiveness data could be obtained. For these systems, the authors have made a judgment about the likely effectiveness of the systems based on the limited information available
- Highway/Rail Intersection Safety:
  - We must make our highway/intersections as safe as possible.



- In the future, ITS may warn drivers through an in-vehicle device on an on-coming train - can avoid fatal collisions and reduce delay.
- ITS can also warn train operators of automobiles or any objects obstructing their path. It is important that they receive such information quickly since it takes a heavy train a few miles until it can stop



***HighwayRail Intersection Safety***

### **III. METHODOLOGY APPROACH**

➤ **Electronic Toll Collection:**

- Where area have toll facilities, electronic toll collection not only reduces delays to travelers, but also reduces the costs and security of counting coins.
- PikePass system - Oklahoma (Statewide)
- Two left lanes are for PikePass users - drive right by the toll booths - also have manual toll booths in the two right lanes
- Transponder that is put on windshield - the system reads this card when the vehicle drives by. The computer chip stores account information. When you drive by the toll booth, it will tell you with a sign whether your account is



**Electronic Toll Collection**

The Intelligent Transport Systems is a new transport system which is comprised of advanced information and telecommunications network for users, roads and vehicles. ITS are steadily expanding with the popularization of ETC (Electronic Toll Collection System) and VICS (Vehicle Information and Communication System), and have effectively smoothed traffic by providing real-time information, eliminating congestion at toll gates, and mitigating environmental impacts by differential toll discounts.

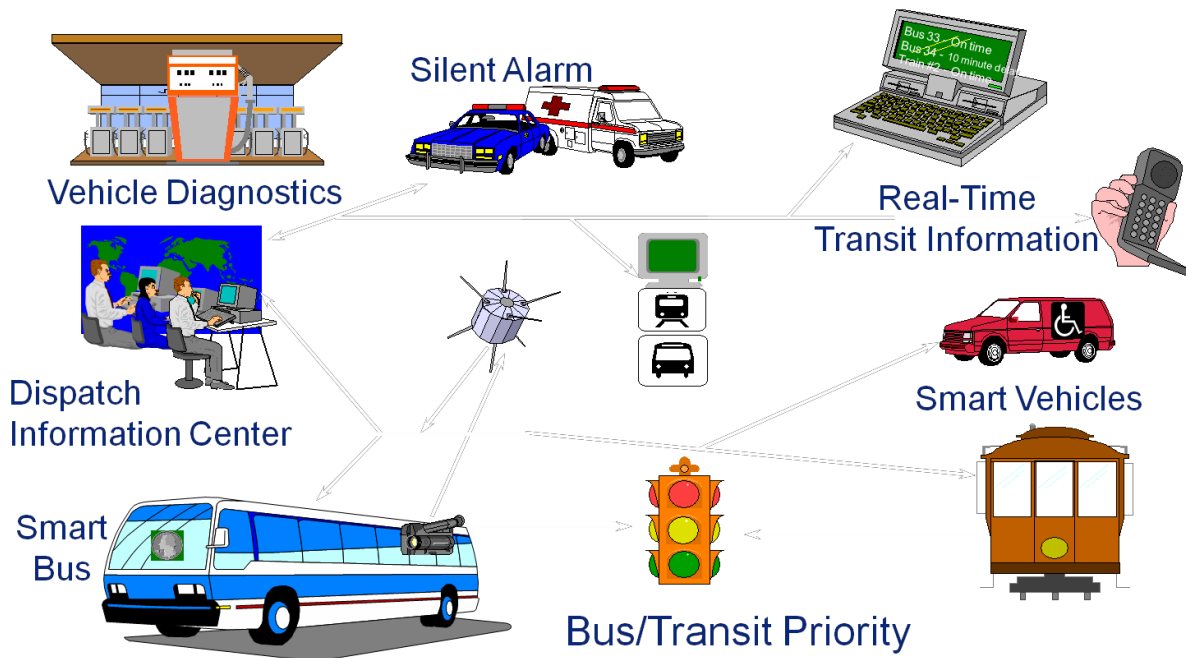
(1) ETC

ETC is a system which allows drivers to automatically pay tolls without stopping their vehicle at a toll booth. The system uses wireless communication between ETC on-board equipment installed in the vehicle and roadside device placed at the collection point. Since starting in 1997, this system is now available on expressways around Japan. ETC communication technology is also used by private operators for non-stop passage through parking gates and ferry boarding, among others.

(2) VICS

VICS transmits road traffic data, such as congestion and traffic restrictions on a real-time basis, to onboard vehicle navigation units and displays data in the form of text, simple graphics and maps. The service started in Japan in April 1996. VICS delivers information using three media: FM multiplex broadcasting, a radio wave beacon and an infrared beacon

## Advanced Public Transportation Systems Technologies



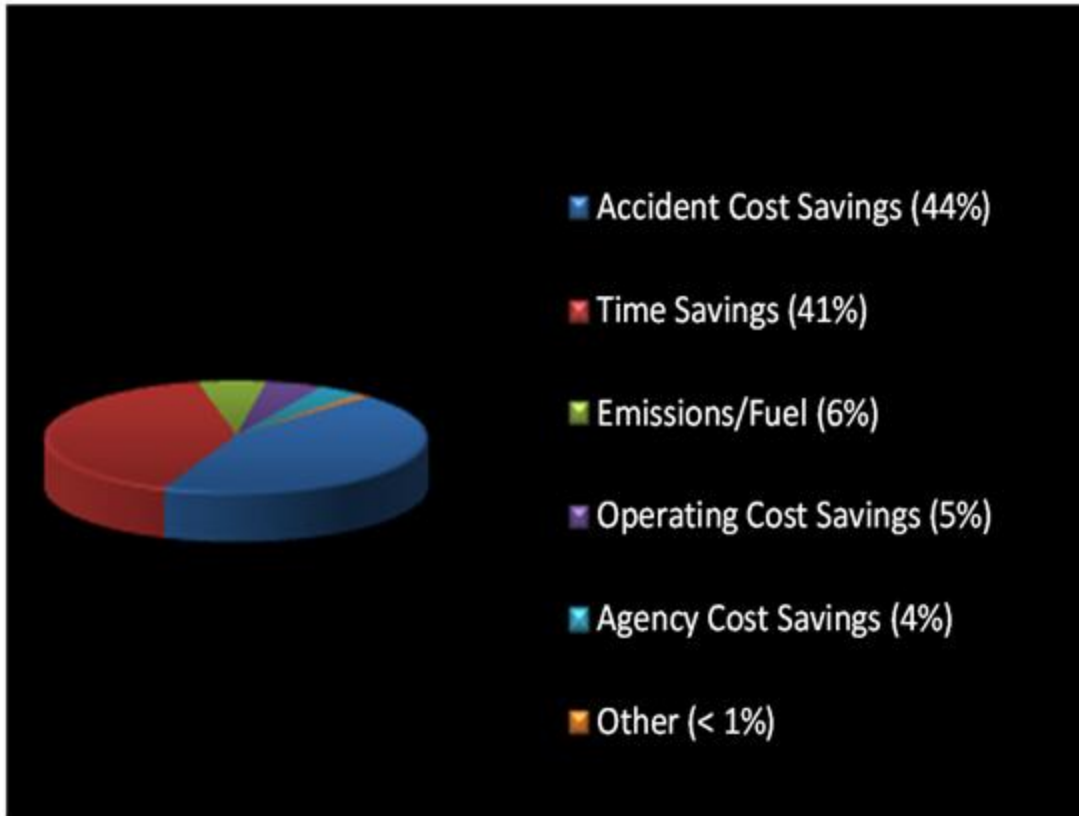
➤ **Vehicle Diagnostics** - automatically alerts driver of mechanical failures

- **Dispatch Information Center** - communicates with transit vehicles to reroute them around incidents and dispatch additional vehicles when they are needed; keep track of where vehicles are located through Advanced Vehicle Location (AVL) systems
- **Smart Bus** - Features may include Trip Recorder, Automated Fare Collection, Automated Passenger Counting, Automated Location Annunciator
- **Bus/Transit Priority** - will hold a green traffic light longer or make it change to green faster to speed transit vehicles on their routes when they are running behind schedule
- **Real-Time Transit Information** - provide information to riders via information kiosks, cell phones, Internet (all shown in picture) to alert riders when vehicles are running behind schedule.
- **Silent Alarm** - transit driver can activate a silent alarm from their vehicle which will alert someone in the dispatch center that something is wrong; dispatcher responds appropriately

➤ **Benefits of I T S applications :**

- Reduction in stops and delays at intersections
- Speed control & improvement
- Travel time improvement
- Capacity management
- Incident management

➤ **Projected ITS Infrastructure Benefits (1996-2017) Accident**



➤ **Present day traffic control and enforcement**

- With the advent of new technologies, it is necessary to update the information and implement, the know how after carefully going through the traffic problems. At present traffic police are regulating the traffic partially and remaining is controlled by semi and fully automatic systems
- . Most of the cities in India have the combination of manual as well as automated systems like signals, vehicles actuated signals, electronic toll collections, CCTV, area traffic control, signal synchronization and coordination with local loop network. to user or to adopt any system for a a given environment, it is important to study and analyze the problem which helps to choose a particular method or system



➤ **Traffic problems**

- Traffic congestion and delays.
- Inadequate public transportation facilities, which run behind schedules, causing inconvenience to public.
- Inadequate road facilities, which is not proportional to traffic growth which is due to increase in number of vehicles with little or no space for widening or for any change.
- Prohibitive costs for any new facilities.
- High accident rates due to varying speed of vehicles and lack of discipline among road users.
- Shortage of manpower.
- Increase in air and noise pollution due to increase in number of vehicles
- Acute parking problem in urban areas.
- Absence of effective monitoring and prevention of traffic violation.
- Non-cooperation from public for any new system or changes
- Systematically employs advanced technologies in the field of transportation to enhance benefits for road users.
- Improves the existing transportation services through interconnected embedded technologies.
- The mean speed can be increased by efficiently monitoring the vehicle speeds.
- Reduction in road crashes.
- Provides system to avoid collision, accidents, and improves night vision and road alertness.
- Enables the rapid arrival of emergency vehicles during accidents to transfer the victims to trauma care centers within the golden hour through incident management systems.

**IV. ANALYSIS**

**Its In India**

- In India 70 State Transport Undertakings which together own and operate 1,13,000 Buses and, provide mobility to 65 million passengers a day, across the length and Breadth of the country.



- APTS technologies along with Fleet Management Systems can make use, to achieve sustainable and environmental friendly transportation for the 21st Century.
- In addition to the above technologies, institutional and market factors also
- play an important role in successful ITS deployment for enhanced safety, mitigation of environmental impacts of transportation systems, enhanced energy performance, and improved
- productivity. ITS has been proved to be the optimal solution to the enigma of building and operating transportation systems to meet expeditiously growing urban travel demand in developed countries.
- the most important task of its India will be the dissemination of its knowledge and imparting training for new professionals.
- ITS India would be able to bring the ITS

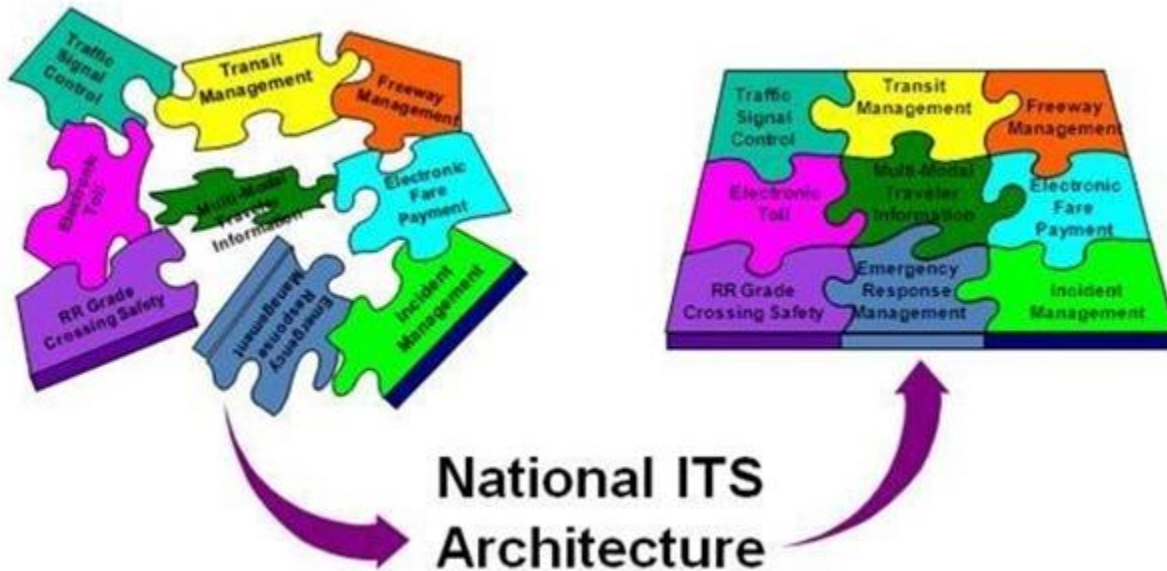
Expertise in the public and private sectors and academia under one umbrella. Taking into account the political, economic and linguistic differences in India from one region to another, the ministry of Surface Transportation may have to take the lead in establishing such an organization. In the Indian context, a professional body of this nature would be expected to consist of regional units in each state with a coordinating central body. In 1980's, number of developed countries started using advanced systems to control and regulate the traffic, accident prevention, parking, toll collections, signalization and other vital tasks. This is still to develop in India to suit our local ambience. Also the problems faced by us are different than those in developed countries.

- The very first equipment to be used in Indian environment was electronic toll collection along the newly created expressways viz., Delhi-
- Noida, Ahmedabad-Mehasana, Mumbai-pune, expressways which is functioning satisfactorily.
- What we need for the present day in India is to save the lives of innocent people from onslaught of accidents, which is termed as "murder on wheels". This is because every year more than rupees 7000 crores are being spent as compensation from authorities. Using ITS, it is possible to save the lives of the victims by transferring them to trauma care centers within the golden hour. Almost, more than 1% of GDP is just paid as compensation. In developed countries, In India, accidents are allowed to take place and compensation is paid later which amounts to a greater magnitude, which is termed as "export cost". In this direction,
- whereas this is always a question mark in developing countries particularly in India.
- What is needed in the present context is the mindset of policy and decision makers to use for Indian highways and problematic locations of urban areas.
- What ultimately is expected is co-operation from end user and the adaptation to the new system

## V. EXPERIMENTAL INVESTIGATION

### ❖ Its architecture:

- Framework for planning, defining, and integrating intelligent
- transportation systems.
- Benefits of Architecture
- Reduces time and resources required to integrate the technologies to local needs
- Helps identify agencies and jurisdictions & seeks their participation



❖ **NEED FOR I T S**

- India is going through a period of drastic change in the transportation area due to:
- Rapidly growing economy.
- Insufficient and inadequate public transportation system.
- Rising vehicle ownership levels.

❖ **Advantages of intelligent transportation systems (its):**

- Improved safety
- Better traffic flow
- Lower travel cost
- Better environmental quality
- Increased business activity
- Greater user acceptance
- Better travel information
- Better planning information

❖ **Why is ITS Important?**

- Offers the next major leap forward in improving safety, convenience and productivity of our personal and commercial travel.
- Improving productivity through advanced technology and management Techniques
- Operating existing programs more efficiently
- Integrating systems
- Providing travel information
- Critical as population and congestion increase, and land and funding for new roads decrease.

## VI. CONCLUSION

The use of I T S in some developed countries like America, Japan and England has given them high progress in the field of transportation. This helped them in their economic progress. Also the traffic congestions, rate of road accidents, wastage of fuels are decreased to a large extend. This gives the people of this country a more economic mean of transportation with advance information of transits. Now transportation has become a safer and efficient mode for these countries. Hence with much more interest and advanced research in the field of I T S, it can be implemented in our country and can prove to be the solution of the traffic problems including traffic congestion, air pollution and traffic accidents

Intelligent transportation systems (ITS) provide a set of strategies for addressing the challenges of assured safety and reducing congestion, while accommodating the growth in transit ridership and freight movement. ITS improve transportation safety and mobility, and enhance productivity through the use of advanced communications, sensors and information processing technologies. When integrated into the transportation system's infrastructure, and into vehicles themselves, these technologies relieve congestion, improve safety, and enhance Indian productivity

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