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Study of Intelligent Transportation System

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ABSTRACT: The Intelligent Transportation Systems(ITS) have develop and deployed in order to improve transportation safety and mobility, reduces environmental impact, promotes sustainable transportation development and enhances productivity. ITS provide transport solution by utilizing state of the art information and telecommunication technologies. ITS combines high technology and improvements in information systems, communication, sensors, controllers and advanced mathematical methods with the conventional world of transportation infrastructure. It is an integrated system of people, roads and vehicles, designed to significantly contributes to improve road safety, efficiency and comfort.

KEYWORDS: ITS Areas, Enabling Technologies

I. INTRODUCTION

Intelligent transportation systems are redefining the way we move on our roadways. ITS is the application of advanced information and communications technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation. These new technologies are designed to ensure that are roadways become more efficient and safe. The introduction of Intelligent Transportation Systems in road vehicles is predicted to enhance traffic safety and mobility considerably. Hence, transport policymakers in most countries are increasingly become interested in possibility of extensive implementation of ITS devices in real traffic environment. The successful deployment of these systems on large scale mainly depends on potential of the consumers. On the other hand, at the current point in development of ITS technologies there has been remarkably little interest shown in segmentation of the market to capture the likely difference in demands and expectations of drivers in various groups of age, gender, country, and so on.

Today's transportation is increasingly facing with the negative impacts of road traffic such as safety hazards, congestion, pollution, as well as consumption of energy and space of the externalities imposed by road transport, un-safety has become a major concern in recent years. This is a particular importance as the motorization is rapidly expanding, and accordingly travelling on roads is becoming ever more dangerous.

From global outlook, it has been recognized that the introduction of ITS in road vehicles is likely to enhance traffic safety and efficiency considerably. Regan et, al. define ITS as a variety of electronic systems , incorporation a number of information processing, communication, control and sensing technologies, serve to address different aspects of transportation problems. ITS can be used , for example , to improve traffic safety and travel efficiency, decrease congestion, increase road capacity, reduce vehicle emission and conserve energy. Although the potential of ITS technologies in environment protection and economic productivity improvements is promising definitely the greatest benefit they confer is in the enhancement of the road users safety.
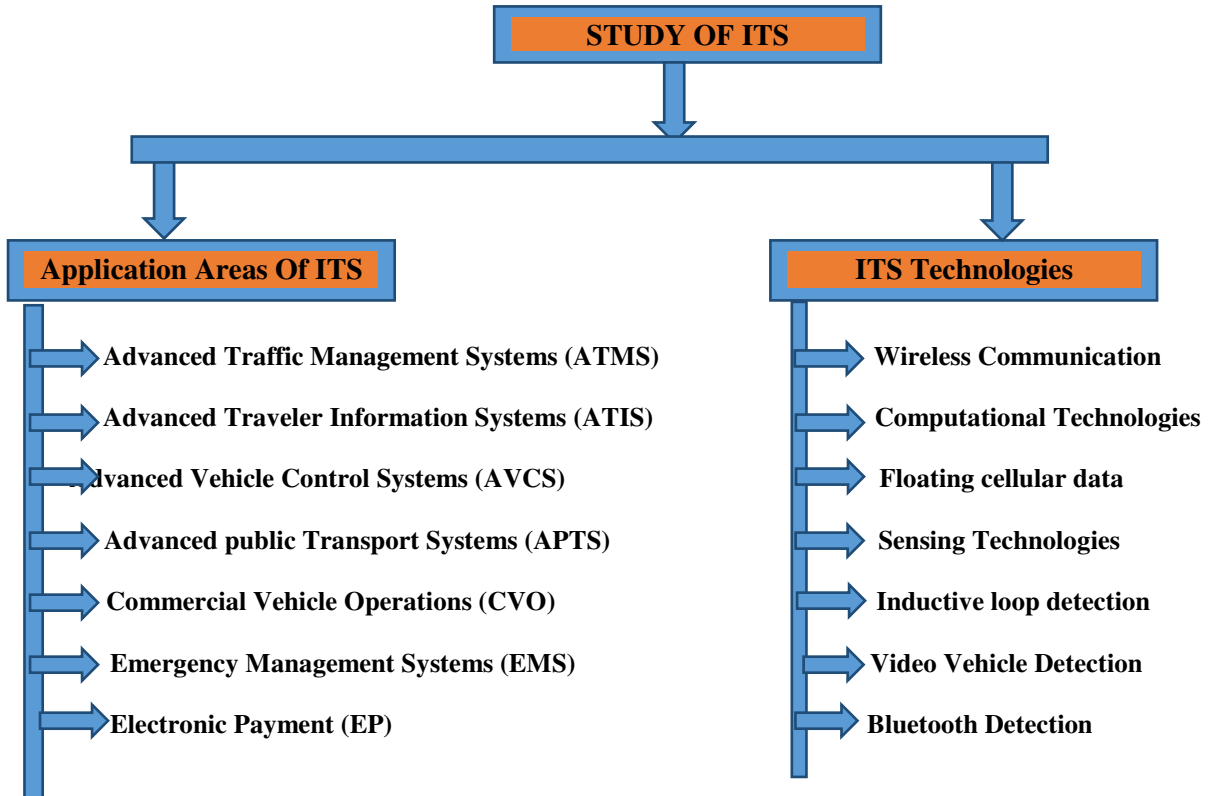
II. METHODOLOGY

A. Aim of ITS

An intelligent transportation systems (ITS) is an advanced application which aims to provide innovative services relating to different modes of transport and traffic management and enable user to be better informed and make safer, more co-ordinated and smarter use of transport network.

B. Objective of ITS

ITS aims to achieve traffic efficiency by minimizing traffic problems. It enriches users with prior information about traffic, local convenience real-time running information, seat availability etc. Which reduces travel time of commuters as well as their safety and comfort.

STUDY OF ITS	
Application Areas Of ITS	**ITS Technologies**
Advanced Traffic Management Systems (ATMS)	Wireless Communication
Advanced Traveler Information Systems (ATIS)	Computational Technologies
Advanced Vehicle Control Systems (AVCS)	Floating cellular data
Advanced public Transport Systems (APTS)	Sensing Technologies
Commercial Vehicle Operations (CVO)	Inductive loop detection
Emergency Management Systems (EMS)	Video Vehicle Detection
Electronic Payment (EP)	Bluetooth Detection

III. STUDIED SECTORS

3.1: Areas Of ITS
A) Advanced Traffic Management Systems (ATMS)

Strategy	Description	Requirements
Incident Management	Early detection & response to unscheduled events	1) Incident detection / confirmation 2) Emergency response / motorist assistance 3) Pre-trip and en-route advisory
Corridor Management	Balancing level of service among alternate parallel routes within a corridor	1) Event and travel time monitoring 2) Pre-trip and en-route advisory
Network Management	Balancing level of service within the network as a function of current conditions	1) Event and travel time monitoring 2) Pre-trip and en-route advisory
Travel Demand Management	Improving traffic flow by managing travel demand	1) Congestion Pricing 2) Ramp metering
Congestion Management	Mitigation the impact of recurring and non- recurring congestion	1) Congestion monitoring 2) Pre-trip and en-route advisory 3) Lane & Ramp metering

B) Advanced Traveler Information System (ATIS)
1. Pre-trip information
   Provide   - Real Flow condition
              - Alternate route
            -Scheduled Road Construction and Maintenance

Helps to decide -Time of departure
            -Mode & Route to be used
2. Route guidance & navigation
3. On trip driver information
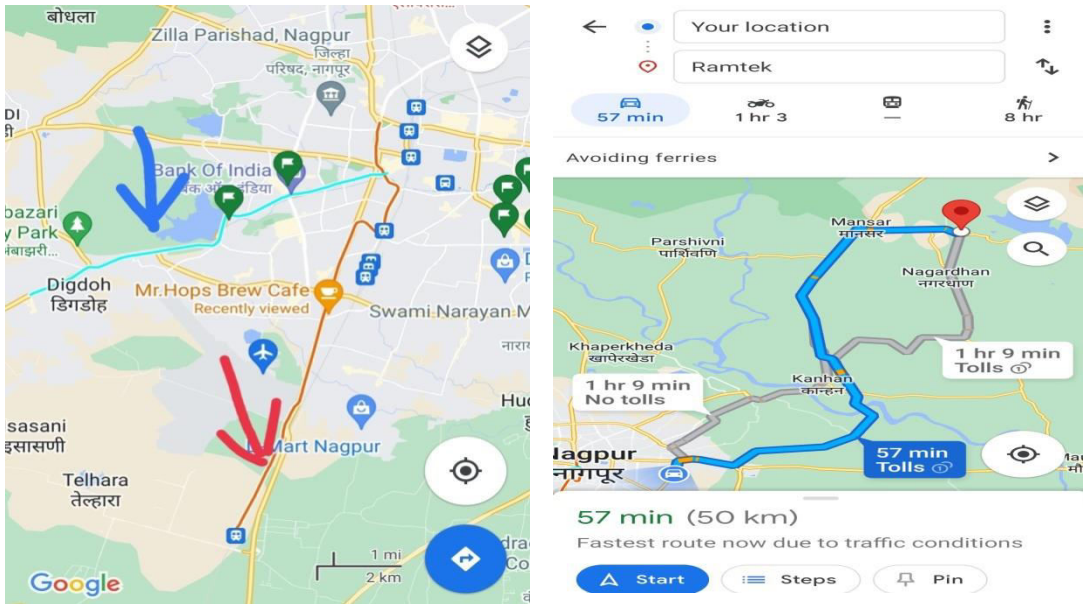4. Parking information
5. Public Transport Information

Fig 1: Pre- Trip information

C) Advanced Vehicle Control System (AVCS)

1. Vision Enhancement
2. Automated Vehicle Information
   - Senses the environment & navigate without human input
   - Uses Radar, Laser, GPS, Sensors, computer vision etc
3. Collision Avoidance
   - Uses radar, laser, camera & GPS.
   - Head-on collision warning
   - Lane departure Warning
   - Blind spot situation display
4. Pre-Crash Restraint Deployment
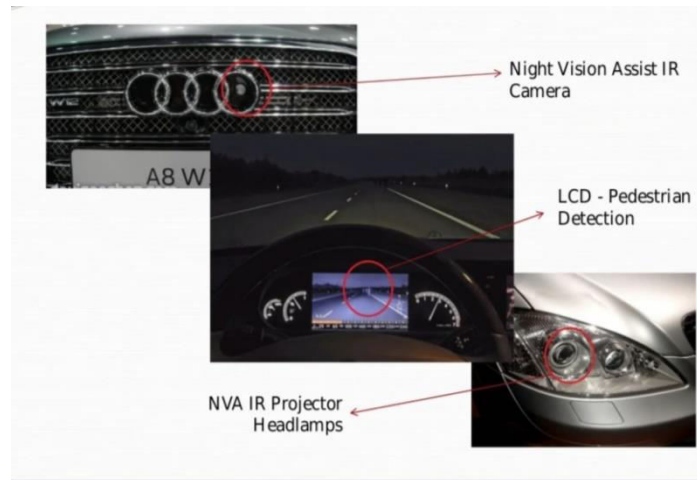
Fig 3:- Vision Enhancement System

D) Advanced Public Transport System (APTS)
1. Public Transport Management
   - Provide real time analysis of vehicles and facilities
   - GPS- based automatic vehicle Location (AVL)
   - Identifies deviation from schedules
   - Assure transfer connection between vehicles and modes
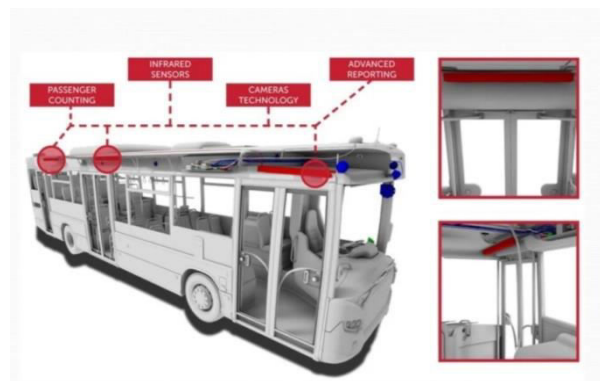2. Shared Transport Management

Fig 4:- Public Transport Management

E) Commercial Vehicle Operations (CVO)
1. Enhance Safety and efficiency of goods vehicle
2. Control or prevent theft of goods
3. Monitor movement of vehicle
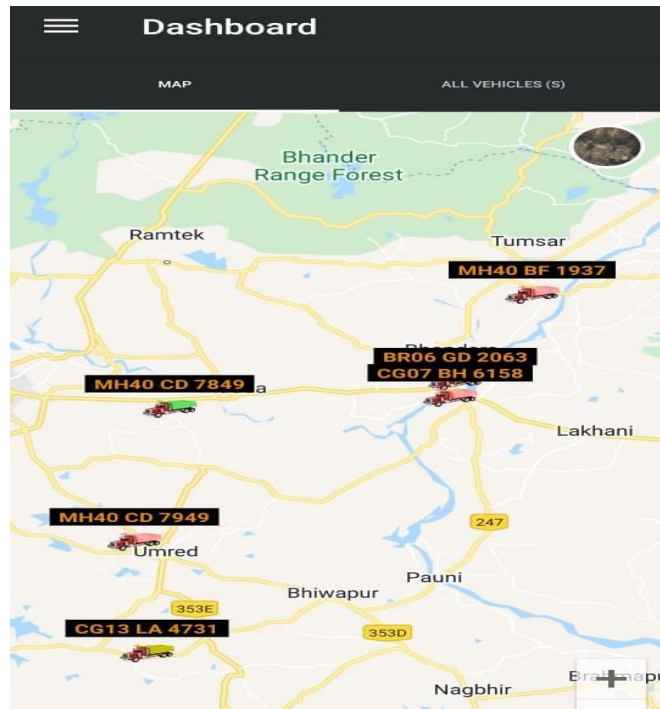4. Automatic Vehicle clearance at check-post/toll plazas

Fig 5:- Commercial Vehicle Operation

F) Emergency Management System (EMS)

1. Emergency Notification and Personal Security
2. Emergency Vehicle Management

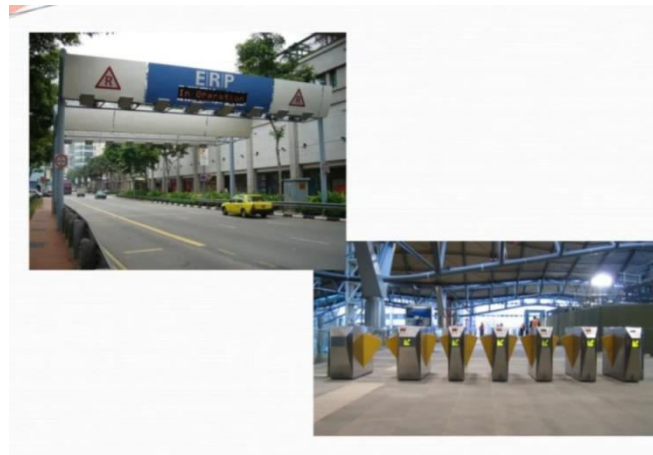**G) Electronic Payment (EP)**

1. Electronic Financial Transaction

Fig 6:- Electronic payment

3.2 – ITS Technologies

A) Wireless Communication

Wireless technologies have been widely developed in the last years and now are ready to meet the increasing demand of communications services of smart transportation systems. Existing radio technologies include Wi-Fi, 4G-LTE, wireless sensor networks, and particularly future 5G technology that will highly focus on the development of intelligent transportation system for terrestrial and aerial vehicles.

It has following types
  - Radio Modern Communication
   - Dedicated short Range communication
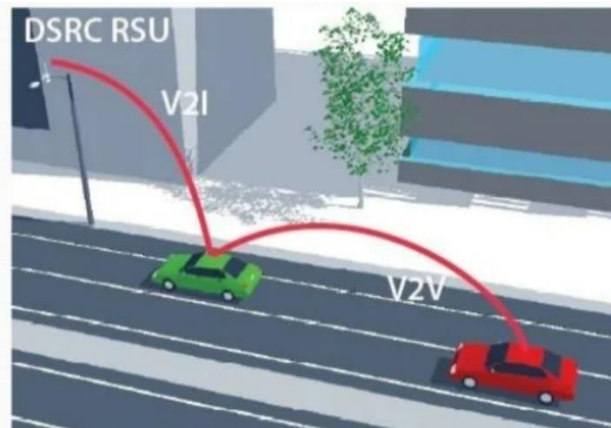   - Long Range Communication.

Fig 7:- Wireless Communication

B) Computational Technologies
 - Use model-based process control & AI
    - Requires real time operating systems, costly micro processors, memory and hardware installed in vehicles. Like Advanced Driver Assistance Systems.

C) Floating Cellular Data
    - To determine traffic speed
    - Uses cellular data to detect direction of travel, speed, travel time, congestion
    - No additional hardware required on road.

D) Sensing Technologies
- Sensors include seismic, thermal, IR, magnetic etc.
    - Capable to monitor temperature, humidity, pressure, vehicle movement, noise, speed, directions etc.
    - Low cost and low power
    - Enhance safety

E) Video Vehicle Detection
      Video based vehicle detection technology is an integral part of intelligent Transportation system due to its non-intrusiveness and comprehensive vehicle behavior data collection capabilities.
It is used for
 - Traffic flow Measurement
 - Automatic Incident Detection
 - Vehicle counting
 - Lane occupancy measurement
 - Gap & Headway

- Detecting Wrong-way vehicles
- Lane by lane vehicle speed measurement
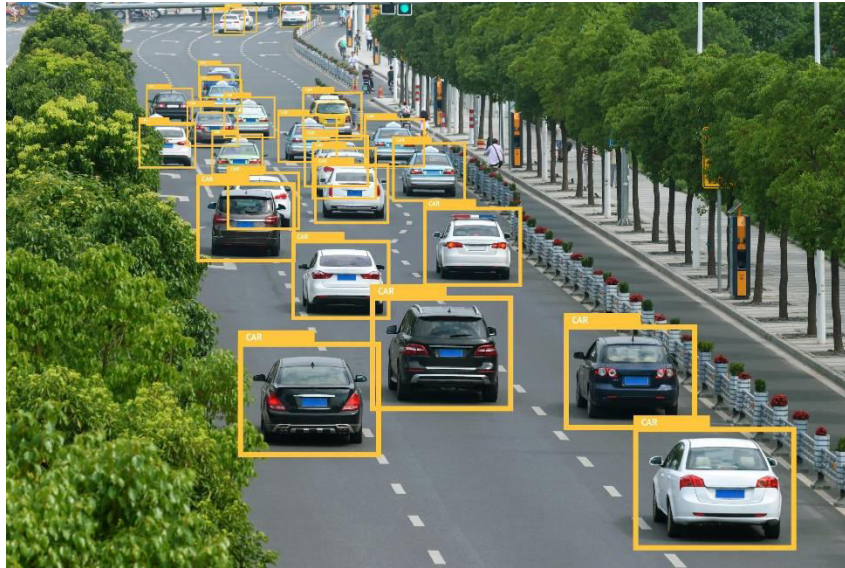- Reduces cost for data collection

Fig 8:- Video Vehicle Detection

F) Bluetooth Detection

The rise of Bluetooth-equipped devices in personal consumer electronics and in-car systems has revealed the potential to develop Bluetooth sensor systems for application in intelligent transportation systems. These application may include measurement of traffic presence, density, and flow, as well as longitudinal and comparative traffic analysis.

It is used for
   - Short range communication
   - Accurate & inexpensive
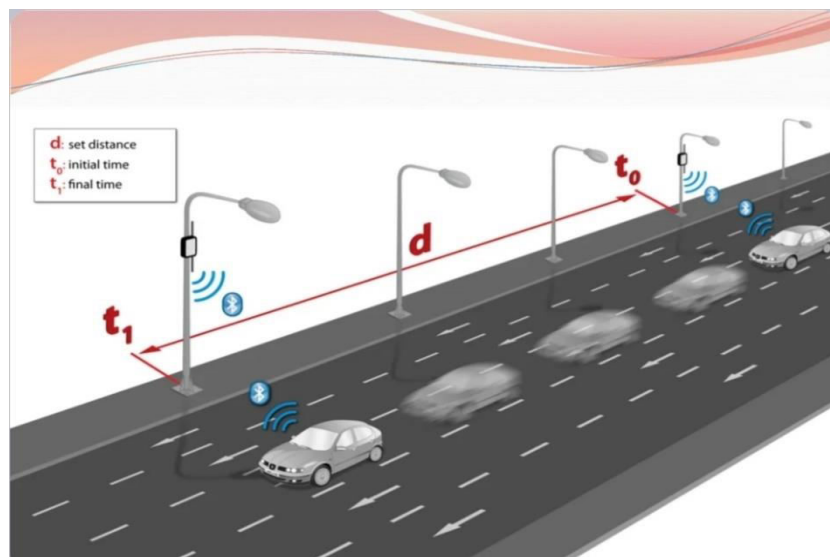   - Travel time measurement

Fig 9:-Bluetooth Detection

IV. **RESULT**

4.1Advanced Traffic Management System In Nagpur

A) Video Surveillance System (CCTV)
   -Monitoring Vehicular &Road related activity
  - Colour, shape and vehicle class

As we studied ITS theory and after visiting to various signal at Nagpur like Sakkardara Square, Telephone Exchange Square, Bhande plot Square I observed that near about every signal at Nagpur are under CCTV Surveillance.
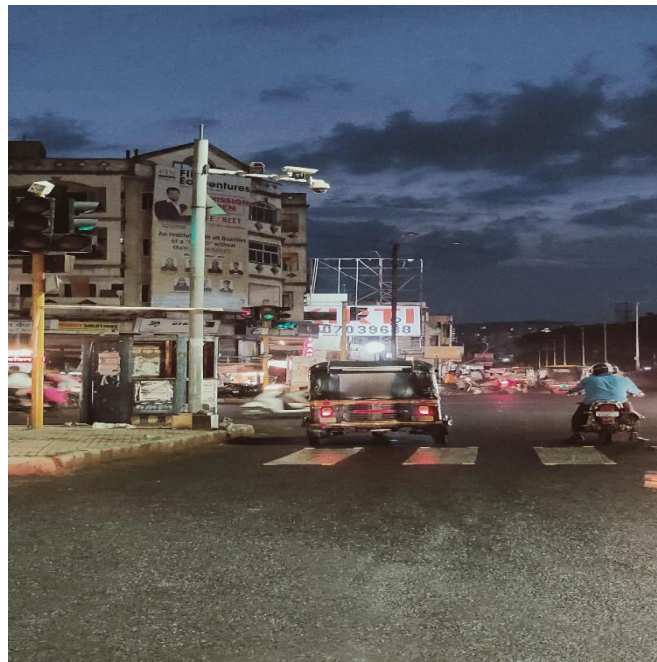

Fig 10:- Video Surveillance System CCTV

B) Video Incident Detection System (VIDS)
  - Automatic Detection of Incidents and generation of Visual alerts or alarms.
  - Warning to nearby travelers/ Road-users
  - Detect Incident like: Vehicle in wrong directions, stalled vehicles, Queuing up of vehicles, Obstructing objects on roads, poor visibility
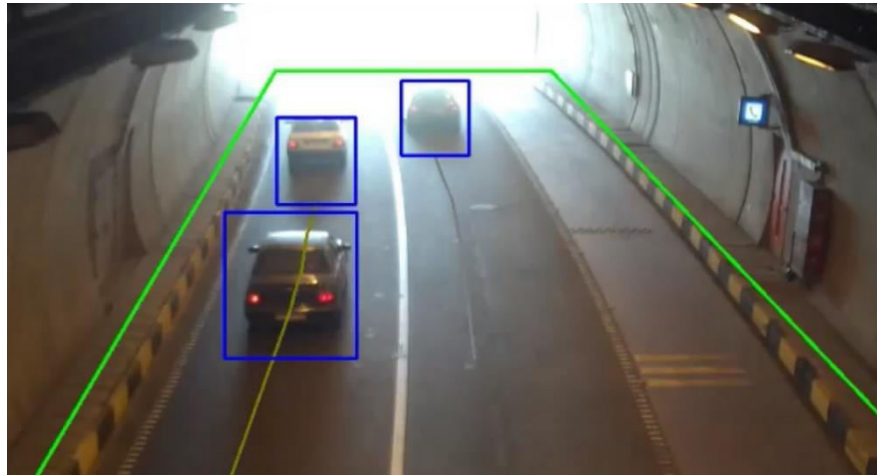

Fig 11:- Video Incident Detection System

C) Vehicle Actuated Speed Display
- Warn Over-speeding
  - Radar Actuated Speed Display +CCTV camera

Fig 12:- Vehicle Speed detector Vehicle at Zero-mile Square Nagpur

D) Emergency Roadside Telephone System
- To make emergency calls to report incidents
  - Hands- free operations- Built in speaker & mic
  - Activate/call Button to initiate call
  - Dial each number in sequence

- Record message, if lines are busy

Fig 13: Emergency Roadside Telephone System At Nagpur-Umred Road

E) Variable Message Signs (VMS)
- Advanced information of road conditions ahead like road incidents, special events, construction or maintenance activities on road.
  - Advises to use alternate route

Fig 14:-Variable Message Signs at Nagpur- Umred Road

F) Weigh in Motion

Weigh-in-motion or weighing-in-motion devices are designed to capture and record the axle weights and gross vehicle weights as vehicles drive over a measurement site. Unlike static scales, WIM systems are capable of measuring
- To log, monitor & enforce load criteria
   - ANPR camera
   - Indicate Vehicle class, breach of length & Weight.

V. CONCLUSION

ITS using in the world is considered as one of the most effective tools for solving transport problems and is a source of creating for new industries. the global goal of ITS design is the creation of a real-time monitoring and management systems for the transport system in order to improve the quality of transport services, reduce transportation costs, improve environmental safety.

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

REFERENCES

1. Shandiz HT, Khosravi M, Doaee M. Intelligent Transport System Based on Genetic Algorithm. World Applied Sciences Journal. 2009: 6(7):908-913.
2. Anastasi G, Antonelli M, Bechini A, Brienza S, D'Andrea E, De Guglielmo D, Ducange P, Lazzerini Conference on Sustainable Internet and ICT for Sustainability (SustainIT), 2013 Oct, 1-4.
3. Wang FY. Parallel control and management for intelligent transportation systems: Concepts, architectures, and applications. IEEE Transactions on Intelligent Transportation Systems. 2010 Sep; 11(3):630-638.
4. Miller P, Liu W, Fowler C, Zhou H, Shen J, Ma J, Zhang J, Yan W, McLaughlin K, Sezer S. Intelligent Sensor Information System For Public Transport–To Safely. Proceedings of 7th IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS), 2010 Aug, 533-538.
5. Alazawi Z, Altowaijri S, Mehmood R, Abdljabar MB. Intelligent disaster management systembased on cloud-enabled vehicular networks. Proceedings of 11th International Conference on ITS Telecommunications (ITST), IEEE, 2011, 361-368.

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