ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 4, April 2017

Intelligent Transportation Systems: A Review

Rama M

Department of Computer Science and Engineering, Galgotias University, Yamuna Expressway Greater Noida, Uttar Pradesh, India

Email Id: rama.m@Galgotiasuniversity.edu.in

ABSTRACT: Transportation or transport is a legal source from one location to another to take or carry things. Transportation faces multiple problems over time, such as high accident rate, traffic congestion, air pollution from vehicles & carbon emissions, etc. In several situations, the transportation sector has faced mitigating the brutality of accident-related crash injuries. Because of this complexity, researchers are integrating virtual transportation technologies known as Intelligent Transportation System. The idea of integration of virtual technologies is a novel in the field of transportation, and it plays a vital part in overcoming global problems. Intelligent Transportation System (ITS) with the aid of new technologies offers a solution to these problems. It is an integrated system that incorporates a wide range of technology for communication, power, vehicle sensing and electronics to solve and handle traffic issues. ITS has been used in developed countries for the past two decades, but it remains a new concept when it comes to developing countries such as India, Brazil, China, South Africa, etc.

KEYWORDS*:* Applications, Intelligent transportation system, Technologies, Transportation, Transport management.

I.INTRODUCTION

Intelligent Transport System becomes better transportation safety and plasticity and amplifies global connectivity by means of productivity improvements extract through the group action of advanced publicity technologies into the moving support and in intelligent vehicle. Intelligent Moving Systems is the implementation of computer, electronics, and communications technology and master plan management in a connection to provide passenger information to improve patrol and control of the simple moving network[1]. These systems involve cars, riders, passengers, drivers and managers, all of whom communicate with each other and the surrounding area, and interconnect with the complex holding systems in order to better protect and improve road systems. Intelligence transportation system is a next generation transportation system consisting of advanced roadstead and vehicle information and telecommunication system Intelligence Transportation system is an implementation of advanced technology utilizing dividing circuitry, communication and advanced sensors[2]. This application offers significant information to passengers while enhancing the transport system's status and performance. ITS is not limited to highway traffic but also offers and operates facilities in navigation systems, air transport systems, water transportation systems and rail systems. Intelligent Transportation System's day to day popularity and increasing demands and growth of smart transportation systems divided into generations[3]. Advanced Traveler Information System (ATIS) incorporates a wide range of technology, such as internet, telephones, cell phones, television, radio, and so on, to help travelers and drivers make informed decisions about trip departures, optimal routes, and accessible travel modes. ATIS provides drivers with information on the route and on the pre-trip, which is helpful in many ways. The availability of pre-trip information enhances drivers ' self-confidence in using freeways, and allows better informed transit choices for commuters. The information and guidance on the route saves travel time, helps a traveler avoid congestion; can improve the performance of the network traffic[4].

II.APPLICATION

A .Road safety application

Road safety systems use wireless V2X connectivity between the surrounding ITS abstraction (e.g., rocket, road infrastructure, etc.) to slow down traffic accidents and protect drivers from different road hazards. To this end, through

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ITS agency periodically broadcasts safety messages to communicate its condition and location information to its community[5]. In addition, each ITS agency may also produce warning messages to nearby vehicles and emergency services based on specific events (e.g., accidents, see road hazards).

B. Traffic Management Applications

Applications for traffic management constitute a second major class of ITS applications, whose main objective is to improve traffic flow control and synchronization and to provide the drivers with various cooperative navigation services. To build and maintain global traffic map databases, these applications depend on the compilation and analysis of the exchanged ITS messages (i.e., between ITS entities). Traffic data is usually obtained from the deployed road side units and/or from road sensors and is transmitted wirelessly for further data analysis and processing to remote trusted data centers[6]. The data collected provide qualitative and location-based information regarding vehicles, drivers and incidents on the road.

C. Autonomous Driving Applications

Autonomous driving, also defined as automated driving, is the next major leap in human transport technology, expected to be implemented by 2020 and fully functional by 2030. This technology will build on automating the felling and driving functions of the vehicle, based on six levels of automation, where the human driver becomes a passenger and future autonomous cars are no longer required to integrate various technologies, including:

(i) Ultrasonic sensors used to detect obstacles;
(ii) lider and/or radar to create a 360-degree field of view to prevent Crash.
(iii) high-definition cameras for real-time detection of road hazards such as pedestrians and animals;

III.VEHICLE DATA COLLECTION

This program gathers vehicle data pertaining to vehicle performance and quality for study analysis and remote monitoring. The system depends on the portal for the car, the software design for the server, the databases and web based interfaces. Support for military, infrastructure, ground stability monitoring, vehicle tracking and predictive maintenance are introduced by the program framework. The example of this program is DRIVE Atlanta Laboratory, Georgia Tech Trip Data Collection in Georgia. The system works on tracking, positioning and speed of second-by-second vehicles via GPS.

IV.INTELLIGENT TRANSPORTATION TECHNOLOGY

A. Wireless communication:

Different forms of wireless communications technologies were suggested for smart transport systems. UHF (ultra-high frequency) and VHF (very high frequency) frequencies are commonly used for short and long-range communication within the mental transport system. Wireless networking has become an immense area. Wireless networks connect devices and transmit data via signals and the utility medium (radio wave, microwave) to transfer data between nodes and to share it[7].

B. Computational Technology:

The duplicated computer technology will develop technologies in which sensors, traveler computers, vehicle computers and computers are used in the static context. Installation of operating system and process in portage vehicles has also enabled the deployment of software application and artificial intelligence system wherever computing and other programs are designed to be integrated into a greater transport system.

C. Floating Car Data/Floating Cellular Data:

Floating car data (FCD) in transport system resolves the track transport speed. FCD operates on different types of data for instant speed, direction of travel, time and location data from mobile phones and the mobile phone acts as a sensor.

Available Techniques for Floating car data detection:

Non Real time:

a. Manual server.
b. Video recording and Manual search.
c. In vehicle data recording.

Real time:

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a. Not inductive loop.
b. Automatic number plate recognition (ANPR).
c. GPS trace and mobile commons like an example GSM.
d. Radio signal triangulation.
e. Road side beacon and dedicated short range tag.

D. Inductive Loop Detection:

An inductive loop detector for vehicles is a detection system that uses magnet to induce an electrical current in a wire. Inductive loops are used to convey and salute signals such as vehicle detector, vehicle passage, and presence. One or more wire loops are fixed underneath the road and attached to the control box once the vehicle passes over or rests on the loop, the inductance is reduced by showing the presence of the vehicle[8].

Benefits:
a. Not affected by environmental conditions.
b. Precise indexing of vehicle presence.
c. Performs well in high and low traffic volumes.

The System Are Consist with Three Components:
a. Loop.
b. Loop Extension Cable
c. Detector

E. Video Vehicle Detection:

Video vehicle recognition in intelligent transport system is a powerful form of detection. It is the most widely used form. Video detection is a processor of the images. It consists of a CPU base microprocessor, and software to solve video images. The user places virtual "detectors" on the video image on a monitor using a mouse and interactive graphics. Data can be forwarded to a server slowly for real-time review.

F. Bluetooth detection:

Bluetooth is a reliable and cost-effective way to calculate travel time and make origin and objective analysis. Bluetooth is a wireless standard that uses Bluetooth devices to communicate between electrons in the passing vehicle. These sensors are mutually capable of calculating travel time and providing data for matrices of origin and ambition. Bluetooth measurement has some differences compared to other traffic measurement technologies.

V.CHALLENGES AND ISSUES OF COMMUNICATION TECHNOLOGIES IN ITS

A. Distance factor:

The distance between any two communications systems plays an important role in whether the contact is secure, without repeated contacts and disconnections, and how much information can be sent without errors needing the information to be resented. A message can travel in one hop communication only to the extent that direct communication is possible between source and destination. Multi-hop communication protocols use intermediate devices to further transmit information over longer distances. The complexity of these protocols, however, means much more testing and simulation is needed to verify that a message can travel from source to destination the required distance. Many implementations of multi–hop protocols use networks as intermediate tools[9].

B. Bandwidth and Medium Access Control factor:

Bandwidth is related to the amount of information that can be sent from source to destination in either a single message or several messages over a communication network if the information does not match a single message, measured in bits per second. Since they talking about a multiple device wireless medium that can send and receive information on the same frequency, a MAC protocol for medium access control is needed to avoid collisions and a way to detect ineffective communication. Different services require a different amount of bandwidth for their work. Generally, emergency messages are brief and require minimal bandwidth, whereas routine information on VANET demands higher bandwidth and larger messages[10].

C. Time / Emergency situation factor:

How vehicles share data with intelligent traffic lights is important to optimize algorithm efficiency and bandwidth utilization. Very few traffic lights will have outdated or unusable information and too many messages and bandwidths,

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there will be several collisions, and the traffic light operator might not have enough time to handle the data in a timely way to use the optimizing algorithm. In the case of an emergency situation such as an accident that has already occurred, an unavoidable accident to occur in the future, a red light violation, pedestrian involvement (mobile device) and bicycle involvement at a traffic light, information is time critical. Emergency vehicle, transit / bus, heavy-duty vehicle priority at traffic light is also a matter.

VI.CONCLUSION

The outcomes of this review of the literature have shown that Intelligent Transportation System is a broad field that encompasses many technologies and plays an important role in the technological era. ITS implementations have the following features to offer: enhanced health, performance, mobility, connectivity, intermodal connections. Most countries take advantage of the Intelligent Transport system. The recipient areas are arterial, freeway, freight, traffic, accident, emergency, data collection, toll collection, environmental issues, traveler information, and historical management of information. This paper introduces a broad area of smart transport system and its implementations and variety of technologies. This paper allows researchers to recognize the overview of the Intelligent Transportation system and provides researchers with information about ITS areas where further study may be required.

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