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An Overview of "Intelligent Transportation System": Transportation Management through Modern Technology- A Survey

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ABSTRACT : *Traffic congestion in the larger cities of the world is a growing problem that has to be taken into account seriously, not only by governments, but also by the private sector. After an extensive survey in the field of Vehicle and Highway System, different alternatives are analyzed to solve this problem and the concept of Intelligent Transportation System is proposed as the best solution. This work analyzes the latest trends in this area and compares the different options. In addition, comparisons between foreign countries, highlighting the advancements in this field of each one of them was conducted. Intelligent Transportation System contains separate fully-functional units with their own characteristics interrelated to each other to conform a flexible system that can respond in an effective way to solve the problem of traffic congestion.*

Keywords: *ITS, GPS, DSRC, VICS*

I. INTRODUCTION

Interest in Intelligence Traffic control System (ITS) comes from the problems caused by traffic congestion because traffic Congestion reduces efficiency of transportation infrastructure and increases travel time, air pollution, and fuel consumption. The United States, for example, saw large increases in both motorization and urbanization starting in the 1920s that led to migration of the population from the closely populated rural areas and the densely packed urban areas into suburbs. The industrial economy replaced the agricultural economy, leading the population to move from rural locations into urban centers. At the same time, motorization was causing cities to expand because motorized transportation could not support the population density that the existing mass transit systems could. A small portion of the population can afford automobiles, but the automobiles greatly increase the congestion in traffic. They also produce a considerable amount of air pollution, pose a significant safety risk and off course traffic congestion.

Information technology (IT) has transformed many industries, from education, health care to government, and is now in the early stages of transforming transportation systems. The future of transportation lies not only in concrete and steel, but also increasingly in using Information technology. Information technology enables elements within the transportation system vehicles, roads, traffic lights, message signs, etc...to become intelligent by embedding them with microchips and sensors and empowering them to communicate with each other through wireless technologies. In the leading nations in the world, Intelligent Transportation System bring significant improvement in transportation system performance, including reduced congestion and increased safety and traveler convenience.[1]

II. KEY FEATURES OF INTELLIGENCE TRANSPORTATION SYSTEM

Global Positioning System (GPS): Embedded GPS receivers in vehicles' on-board units, receive signals from several different satellites to calculate the vehicle's position. This requires line of sight to satellites. GPS is the core technology behind many in-vehicle navigation and route guidance systems. Several countries, notably Holland and Germany, are using satellite-based GPS devices to record miles traveled by automobiles. [2]

Dedicated-Short Range Communications (DSRC): DSRC is a short- to medium-range wireless communication channel, operating in the 5.8 or 5.9GHz wireless spectrum, specifically designed for automotive uses. Critically, DSRC enables two-way wireless communications between the vehicle and roadside equipment. DSRC is a key enabling technology for many intelligent transportation systems, including vehicle-to-infrastructure integration, vehicle-to-vehicle communication, adaptive traffic signal timing, electronic toll collection, electronic road pricing, information provision, etc. DSRC is a subset of radio frequency identification (RFID) technology. The technology for ITS applications works on the 5.9GHz band or the5.8GHz band. At present, DSRC systems in Europe, Japan, and the United States are generally not compatible.

Wireless Networks: Similar to technology commonly used for wireless Internet access, wireless networks allow rapid communications between vehicles and the roadside, but have a range of only a few hundred meters. However, this range can be extended by each successive vehicle or roadside node passing information onto the next vehicle or node.[2]

Mobile Telephony: ITS applications can transmit information over standard third or fourth generation (3G or 4G) mobile telephone networks. Advantages of mobile networks include wide availability in towns and along major roads. However, additional network capacity may be required if vehicles are fitted with this technology, and network operators might need to cover these costs. Mobile telephony may not be suitable for some safety-critical ITS applications since it may be too slow.

Radiowave or Infrared Beacons: Japan's Vehicle Information Communications System (VICS) uses radio wave beacons on expressways and infrared beacons on trunk and arterial roadways to communicate real-time traffic information. VICS uses 5.8GHz DSRC wireless technology.[3]

Roadside Camera Recognition: Camera or tag-based schemes can be used for zone-based congestion charging systems or for charging on specific roads. Such systems use cameras placed on roadways where drivers enter and exit congestion zones. The cameras use Automatic License Plate Recognition (ALPR), based on Optical Character Recognition technology, to identify vehicle license plates; this information is passed digitally to back-office servers, which assess and post charges to drivers for their use of roadways within the congestion zone.[3]

Probe Vehicles or Devices: Several countries deploy so-called "probe vehicles" that report their speed and location to a central traffic operations management center, where probe data is aggregated to generate an area-wide picture of traffic flow and to identify congested locations. Extensive research has also been performed into using mobile phones that drivers often carry as a mechanism to generate real-time traffic information, using the GPS-derived location of the phone as it moves along with the vehicle. As a related example, in Beijing, more than 10,000 taxis and commercial vehicles have been outfitted with GPS chips that send travel speed information to a satellite, which then sends the information down to the Beijing Transportation Information Center, which then translates the data into average travel speeds on every road in the city.

III. CONCLUSION

In order to achieve the full potential of ITS, a careful systematic approach is required in the design and planning, development and implementation, which addresses the problems of user needs and benefits, system architecture and integration issues while at the same time giving due attention to other national and international medium and long-term objectives related to such issues as land use and regional planning, infrastructure design, transportation system management, and many other important areas that are directly or indirectly influenced as a result of ITS implementation. The great potential offered by technologically and economically viable ITS was quickly recognized as an efficient way to resolve many simple and complex transportation problems. Recent expectations in relation to this potential have suggested, for example, that ITS will lead to a 50 per cent reduction in road fatalities; a 25 per cent reduction in travel time; a 50 per cent reduction in traffic delays; and a 50 per cent reduction in city pollution .

REFERENCES

1) Alberto Martin, Hector Marini and Sabri,
" INTELLIGENT VEHICLE / HIGHWAY SYSTEM: A SURVEY"(Part 1), Tosunoglu Florida International University, Department of Mechanical Engineering Miami, Florida 33199[2]
2) Ayman Smadi, Kate Miner "Intelligent Transportation Systems (ITS)" Statewide Plan-Final Report,October 2004 (Updated September 2005) North Dakota Department of Transportation.(page 22 -39)
3) Bruman, "Technologies for Intelligent Vehicle Highways:Technology Tutorial Series, V.2, Boston, Massachusetts, November 1994.[3]
4) CODA, A., ANTONELLO, P. C. and PETERS, B. (1997). "Technical And Human Factor Aspects Of Automatic Vehicle Control In Emergency Situations". Proceedings, 4th World Congress on Intelligent Transport Systems, 21-24 October, Berlin, Germany. ITS America.
5) Drane, C., Rizos, C., Positioning Systems in Intelligent Transportation Systems, Artech House, 1998
6) Ethernet in Intelligence Transportation System Applications: Intelligence is essential.Cisco system,important notice and policy statement.
7) Elliott, S., D., Wireless Communications for Intelligent Transportation Systems, Artech House, 1995.
8) ERTICO, Editor, "Toward an Intelligent Transport System", Proceeding of the First World Congress on Applications of Transport Telematics and Intelligent Vehicle Highway systems,Vol. 1-6, Paris,France, December 1994.
9) ERTICO (1997). Expected benefits of ITS. ERTICO vision presented at the Fourth International World Congress on Intelligent Transport Systems in Berlin, Germany. EuroNCAP (1998).
10) INTELLIGENT TRANSPORTATION SYSTEMS AND ROAD SAFETY, Brussels ,1999.European Transport Safety Council, Rue du Cornet 34.
11) Klein, L., A. "Vehicle Detector Technologies for Traffic Management Applications", Part 1,
12) Nwagboso, C., O., Advanced Vehicles and Infrastructure Systems:Computer Applications, Control and Automation. John Wiley & Sons, April 1997.
13) Joseph m.sussman. PERSPECTSIVE ON INTELLIGENT TRANSPORTATION SYSTEM- Massachusetts Institute of Technology Chambridge.[1]
14) Robert C. Johns, "Artificial Intelligence Applications in Transportation System": Report of 5th International conference on Artificial Intelligence.Paper no.4, (page 4-8)
15) U.S. Dept. of Transportation, National Highway Traffic Safety, Administration, "Examination of Reduced Visibility Crashes and Potential IVHS Countermeasures Microform", (page. 663 - 678) 1995.
16) Zhao, Y., Vehicle Location and Navigation System. Artech House,1997. ALM, H. & NILSSON, L. (1994). Changes in driver behavior as a function of handsfree mobile telephones – a simulator study. Accident Analysis and Prevention 26(4), pp 441- 451.