

Study of Automated Highway System

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Abstract— Automated highway system (AHS), which promises an increase in traffic capacity. The core of this protocol to achieve a fully automated highway system is four-layer hierarchical control architecture. Automated Highway System, abbreviated as AHS is newly developed idea which uses different sensors and microprocessors for automatic design process. The management and control of traffic system using roadside controllers and intelligent vehicles is innovative technique for the design of highway system. The Automated Highway System is the design concept introduced to enhance safety, efficiency and many other vehicular as well as user characteristics of highways. This concept has introduced for the improved architectural layout of highway design and also helped in reducing the environmental effects of the vehicles running on the highways.

Keywords: Automated Highway System (AHS)

I. INTRODUCTION

The problems associated with the annual growth of automobile transport start spreading from large metropolitan cities to small towns. For many years, scientists and engineers have envisioned building an automated highway system (AHS) to increase both the safety and efficiency of the nation's highways. In such a system, the vehicles become driving robots, capable of sensing and reacting to the surrounding environment while the driver is free to do other tasks. Automating the vehicle has significant potential it can reduce accidents caused by driver error and can potentially increase traffic-carrying capacity and fuel economy by eliminating human driver inefficiencies.

II. LITERATURE REVIEWS

A. Alexander Novikov, Pavel Pribyl

The article describes the potential for capacity increase of a highway section with use of intelligent transport systems. The implementation results in significant reduction of congestion and accident rate decrease on a highway. The problems associated with the annual growth of automobile transport start spreading from large metropolitan cities to small towns. The level of motorization in the Eastern European countries is about 400 vehicles per 1000 persons of the population. The action plan determines the priority fields of activities like Optimum use of automobile road, transport, route data, safety, and incorporation of vehicles into the traffic infrastructure.

B. Prof. Dr.-Ing.habil, Wolfgang Kuhn

Vehicles need to recognize and record the roadway and the associated driving area elements with the help of sensors (stereo cam-eras, radar, laser scanners etc.) in highly automated driving processes; this information then needs to be converted into a digital 3D model in real time. The vehicle

can then locate and orient itself and move in a so-called obstacle-free and restricted 3D area. Localizing the vehicle precisely in the surroundings is often difficult for several reasons: The volume of data needing to be processed in real time, the accuracy of the object recognition process and the multiple disturbances like the weather, daytime and nighttime or the traffic situation etc. To gradually solve the object recognition problems in real time when relying on the available sensors and disturbances, the vehicle should have a detailed prior knowledge of the traffic infrastructure on the planned route before the journey starts; this can take place through highly developed maps (HD maps with separate layers) within its navigation system. The localization of the vehicle can take place faster and more accurately as it compares the prior knowledge and the knowledge obtained from its surroundings.

C. Sanju Meena & Dr. Om Prakash

Highway construction is important part of infrastructural development of any zone and the highway construction process are carried out in a number of ways these days. Automated Highway System, abbreviated as AHS is newly developed idea which uses different sensors and microprocessors for automatic design process. The management and control of traffic system using roadside controllers and intelligent vehicles is innovative technique for the design of highway system. The Automated Highway System is the design concept introduced to enhance safety, efficiency and many other vehicular as well as user characteristics of highways. This concept has introduced for the improved architectural layout of highway design and also helped in reducing the environmental effects of the vehicles running on the highways.

D. Lakshmi Dhevi, Baskar Bart, De Schutter, Hans Hellendoorn

The present a routing guidance approach that can be used in Automated Highway Systems (AHS). Consider automated highway systems in which intelligent vehicles organized in platoons drive to their destination, controlled by a hierarchical control framework. In this framework there are roadside controllers that provide speed and lane allocation instructions to the platoons. These roadside controllers typically manage single stretches of highways. A collection of highways is then supervised by so-called area controllers that mainly take care of the route guidance instructions for the platoons and that also coordinate the various roadside controllers in their area.

E. Nayan R. Wasekar, Prof. Feroz H. Khan

A combination of market forces, cost constraints, and other factors necessitate incremental evolution of a fully automated highway system (AHS) rather than instantaneous deployment. Thus, an understanding of the interdependencies

among required AHS functional capabilities is essential for planning. This paper proposes a set of three AHS functional evolution reference models that include essential as well as supplemental functions. The reference models include lateral motion handling, longitudinal motion handling, obstacle handling, and selected infrastructure support functions. This family of three models is used to present the needs of baseline autonomous tactical vehicle operation, the benefits of adding inter-vehicle communications, and the benefits of adding infrastructure support. The reference models reveal a critical need for vehicle motion prediction capability, and suggest that both communications and infrastructure support are beneficial but not mandatory for achieving an AHS. Furthermore, there appear to be a number of safety and efficiency benefits that can be realized with only partial automation and in some cases no automation. These results could help set priorities and guide strategies for incremental introduction of AHS technology into vehicles and roadways.

F. Dr. S. S. Jain, Dr. M Parida

Road Safety Audit (RSA) is a formal procedure for assessing accident potential and safety performance of new and existing roads. RSA is an efficient, cost effective and proactive approach to improve road safety. It is proved that RSA has the potential to save lives. The RSA was originated in Great Britain and is well developed in countries like UK, USA, Australia, New Zealand, Denmark, Canada, Malaysia and Singapore. It is at varying stages of implementation in developing nations like India, South Africa, Thailand and Bangladesh. RSA appears to be an ideal tool for improving road safety in India, as basic and accurate data on accidents have yet to be collected.

G. Sangeeta Mishr, Ajinkya Bavane

Automated highway system's ambitious goals can be achieved by: Developing advanced concepts for advanced road vehicles for passengers and goods. Most of the earlier projects addressed isolated aspects of the mobility problems of cities, whereas automated highway system focuses on the overall urban transportation problem. Introduce new tools for managing urban transport. Automated highway system will develop tools that can help cities to cross the thresholds that are preventing them from introducing innovative systems. For instance, the absence of certification procedures and the lack of suitable business models will be addressed. Take away barriers that are in the way of large-scale introduction of automated systems. Some of these barriers are of a technological nature, some are of a legal or administrative nature: for example, the legal requirement for vehicles using public roads where the driver is responsible for the vehicle at all times, which effectively prohibits driverless vehicles from using public roads. Validating and demonstrating the concepts, methods and tools developed in automated highway system in European cities. In a number of other cities, studies will be carried out to show that an automated transport system is not only feasible, but will also contribute to a sustainable solution for the city's mobility problems, now and in the future.

H. Vishnupriya.R & Dr.N.P.Ananthamoorthy

Most Electronic toll collection systems around the world are implemented using Dedicated Short Range Communication technology. The Automatic toll tax payment system is proposed and the amount transaction information sends to the cell phone of the motorists through the GSM modem technology. It is an innovative technology for expressway network automatic toll collection method. The aim of the project is to design a system, which automatically identifies an approaching vehicles and records vehicles number and time. The vehicle belongs to the authorized person, it automatically opens the toll gate and predetermined amount is automatically deducted from its account. Suppose the illegal entry through gate is observed, then it will be registered and providing the warning sound. Each vehicle will hold an RFID tag and it contain unique identification number assigned. Whenever the vehicle passes the toll booth, the amount will be deducted from his prepaid balance. New balance will be updated. Incase if one has insufficient balance, his updated balance will be negative one. The data information is exchanged between the motorists and the toll authorities, thereby enabling a more efficient toll collection by reducing traffic and eliminating possible human errors.

I. Russell Scott Gomke

The use of Automated Highway Systems (AHS) technology has been proposed as a mitigating application to vehicle collisions in rural areas. The application of AHS in the urban environment is being tested and evaluated to reduce traffic congestion with secondary consideration to safety. Typically, recurring congestion is not a problem in the rural environment, while increasing traveler safety is a primary concern. Automated Highway Systems have the potential to address safety issues in the rural environment by providing the driver with critical collision warning and avoidance information.

J. Athira Mohan & Dr. V.S. Landge

The simultaneous increase in population and the number of vehicles led the road authorities to get more focus on the road safety improvements. According to the recent road accident data, the highly populated Maharashtra state has reported the highest accident rate which calls for the need of safety improvements. For this purpose, Identification of accident prone location is considered as the first step in road safety improvements. This paper mainly aims to identify the accident prone locations along Amravati- Nagpur road stretch from Asian highway 46. The top accident prone spots were selected as black spots based on Weighted Severity Index Method and some suggestions are made to improve the transportation system.

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