

Driving Safety Support System in UTMS 21

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SUMMARY

The Next Generation Traffic Management System toward (UTMS'21) is a new initiative to be developed by the Universal Traffic Management Society of Japan. UTMS'21 can be developed by adding the DSSS (Driving Safety Support System) to the existing UTMS (the Universal Traffic Management System). DSSS must be a core program of the UTMS'21 and the essential technologies such as infrared vehicle detector and driver's license IC (Integrated Circuit) card will be used for increasing the safety of driver as well as decreasing the occurrence of traffic accident.

INTRODUCTION

In Japan, a nationwide traffic control system has been established since the beginning of 1970th, which has been followed by UTMS since the beginning of 1990th for the purpose of better road traffic safety and efficiency. In this paper, a new initiative called UTMS'21 is presented, which is a next generation traffic management system in Japan to improve safety, efficiency and environmental quality of road traffic more and more in the coming aged society. In addition, DSSS which would be a core system of the UTMS'21 is also presented. The conceptual design of DSSS is very new and unique compared with ITS (the Intelligent Traffic System) programs in other countries from the stand point of driver's license IC card.

SOCIAL NEEDS FOR THE 21ST CENTURY : AGED SOCIETY

Recently, in Japan, the population of the elder people has been remarkably increased at peerless speed in all over the world. It is sure high aged society will come in 21st century where a quarter of people are older than 65 years old. Therefore, in the view of the future traffic society, it is indispensable to consider about elder people and it is very important that all sort of policies for 'friendly traffic society for elder people' will be made.

There are 70 million licensed drivers, and aged drivers over 65 years old are 5

million, which correspond to 8% of all. The characteristics of the traffic accidents caused by over 65 years old drivers are followings;

- (1) 9,924 people die caused by traffic accidents in a year, and aged people occupy 32% of them.
- (2) Aged drivers occupy 32% of 402 dead persons caused by violation of stop sign. It shows the highest ratio compared with other generations.
- (3) A great deal of accidents are caused by driving mistakes and happen at intersections. In particular accidents in right-turn and a rear-end collision are markedly.

It is assumed that it is too difficult for elder drivers whose response speed become lower due to age to make complex judgment at intersections. Therefore it is indispensable in coming aged society to deploy traffic safety facilities to support driving and to lighten the burden for elder drivers.

DRIVING SAFETY SUPPORT SYSTEM

NEXT GENERATION TRAFFIC MANAGEMENT SYSTEM

UTMS consists of five sub-systems and ITCS (Integrated Traffic Control System) which is the core system of all. In order to realize these sub-systems, UTMS makes use of existing facilities and infrared vehicle detectors. The key component for the UTMS is a infrared vehicle detector which has the abilities of vehicle detection and interactive two-way communication between infrared vehicle detectors and in-vehicle units equipped with vehicles to collect and supply traffic information. The characteristics of infrared vehicle detector are followings;

- (1) To have both functions of collection and supply of traffic information.
- (2) To make interactive two-way communication with each vehicle.

Therefore it is possible to control and communicate with vehicles lane by lane. Fig.1 shows the concept of UTMS'21 as the next generation UTMS.

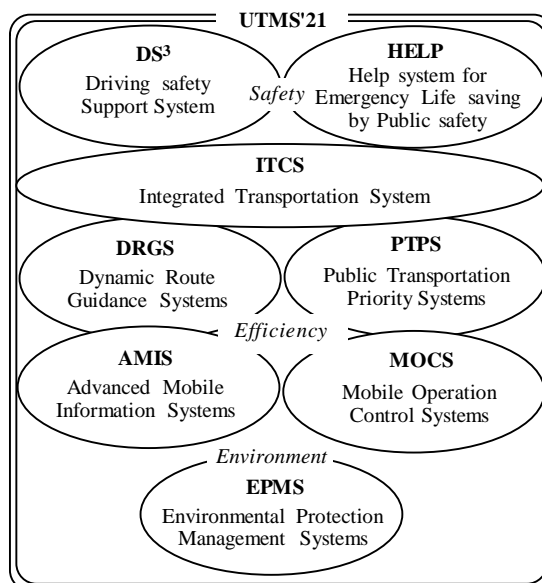


Fig.1 Concept of UTMS'21

UTMS will drive forward to deploy the fruit of R&D and experiments about five sub-systems and ITCS to the whole country, and continue R&D and experiments to improve them. In UTMS'21 DSSS (Driving Safety Support Systems) and HELP (Help system for Emergency Life saving by Public safety) are added to existing UTMS.

In R&D and experiments about DSSS, making sure of the safe and free mobility for aged drivers is studied as main theme, and the effective methods of decreasing traffic accidents are researched making use of analysis of actual traffic accidents. In order to realize it, the methods of decreasing traffic accidents by the harmony of the intelligent vehicles and advanced infrastructure are studied communication technologies between infrastructure and such road users as drivers and pedestrians.

CONCEPTUAL DESIGN OF DRIVING SAFETY SUPPORT SYSTEM

Application of Driver's License IC Card for Driving Characteristics Support

The system makes sure of the safety by operating vehicle driving support function (information provision, warning and driving assistant control) according to the driving characteristics of the drivers especially for elder drivers.

- (1)Evaluating the driving characteristics of the driver by way of the driving simulator and the data is stored into the driver's license IC card.
- (2)When the driver starts to drive his vehicle, he should insert his own driver's license IC card.
- (3)Then the driving support computer unit reads out the driving characteristics information of the driver and the support functions are carried out according to the information.
- (4)While he is driving, his daily driving characteristics would be added in the IC card. It would be used at renewing his license.

Safety Improvement for Non-signalized Intersection Accidents

For non-signalized intersection accidents;

- (1)When the vehicle approaches the stop line at a non-signalized intersection, the system inform the driver with voices that how distance the stop line is by way of the in-vehicle D-GPS (Differential-Global Positioning System), digital map and infrared vehicle detectors. Information about the intersection characteristics also would be supplied
- (2)If the vehicle is running over the safe speed limit, the mobile unit would warn the driver the speed slower. If the driver is aged, the mobile unit operates according to his own driving characteristics.
- (3)It can be that the traffic state of crossing roads and information of queue on the approach would be supplied making use of two-way communication function of infrared vehicle detectors.

Safety Improvement for Right-turn Accidents

The accidents between a right-turn vehicle and a motorcycle run out from the behind the queue of vehicles occur frequently. This systems inform the existence of the vehicles and motorcycles at dead angle to the drivers in advance. This system

inform that the intersection is high accidents-frequency place and warn the existence of go-straight vehicles to the drivers by way of in-vehicle unit with voices.

Safety Improvement for Pedestrian Crossing

Driver's license IC cards for elder drivers and White IC cards for elder people, handicapped people and children without driver's license would be prepared. According to the information stored in the IC card, the green time of the traffic signal would extend enough longer for them to cross the street safely. And also the read unit installed near crosswalk reads out the information stored in the IC card, and transmits the information to the up stream infrared vehicle detectors. Then it can give the warning of existence of crossing pedestrians to the approaching drivers.

CONCLUSION

In this paper, the basic conceptual design of DSSS which would be a core program of UTMS'21 is presented and some applications for DSSS are also proposed based on the traffic accidents status in Japan. Above all, application of driver's license IC card to the DSSS is very important for defining a driver as one of the system components of DSSS. Thus this system has potential to increase the safety of drivers and decrease the traffic accidents. DSSS in UTMS'21 is now under research and development by the Universal Traffic Management Society of Japan in cooperation with National Police Agency of Japan, Ministry of Transport, universities and industries. DSSS should be also a global challenge toward the 21st century.

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