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Applications Used in Intelligent Transport Systems

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Abstract: *In this article analyzed applications and tools used in intileegent transport systems. Applications are compared each other, which is used in Uzbekistan public transport sector.*

Keywords: *application, public transport, ATTO, Yandex, ITS.*

INTRODUCTION

Globally, Japan is one of the most advanced countries in terms of the number of citizens using ITS applications and the development of the technologies used in these applications. Japan 's main goal in this field is to inform people, roads, and vehicles to solve road problems such as traffic congestion, traffic accidents, and the reduction of environmental impact and the integration of communication technologies.

RESEARCH AND METHODS

The comprehensive ITS plan created for the country includes navigation systems, electronic toll collection systems, safe driving support, traffic management optimization, road management efficiency improvement, public transport support, commercial transport work. improving efficiency, assisting pedestrians and assisting in emergency situations. Activities such as answering machine operations are included. In accordance with the goal of "Creating the world 's most advanced information technology society " adopted by the Japanese government in 2013, the number of people killed in traffic accidents in 2018 should be reduced by 2500 from 2018 to 2021 and "the world 's most " safe road traffic" and " two strategic goals" were defined as "being a society".

Real-time traffic information across the country is provided by mobile devices, such as fixed sensors or devices installed on or near the road or mobile phones installed in vehicles such as taxis, with a traffic incident reporting feature. Although the first ITS application in Japan was a traffic control center established in 1973 on a Metropolitan highway, Japan first installed such a system nationally in the 1990s under the name VICS, and since 2003 the system has been in operation. With this system, traffic and traffic restrictions such as circumstances about data at the VICS Center collected and processed. This information is then transmitted via radio waves or infrared transmitters and FM multiplex in the form of text, simple graphics and maps for display in navigation systems and other vehicle systems. The system operates 24 hours a day, every day of the year, and as of 2013, 36 million vehicles in traffic can receive real-time information from this system. This system because of in 2010 CO2 emissions by 2.4 million tons decrease guess is being done.

Another AUS application operating in Japan is UTMS (Universal Traffic Management System), which aims to create a safe, comfortable and environmentally friendly traffic environment. The system works with the help of infrared transmitters that provide real-time traffic information, forming a two-way communication system between vehicles and traffic control centers. The system also supports safe driving by predicting traffic flow, helping people and their cargo move more efficiently on the road. Some sub-systems within UTMS have been used in all regions since

the end of 2012, and AMIS (Advanced Mobile Information Systems), which provides information to in-car information systems with radio broadcasts and infrared transmitters in addition to traffic, is used in 15 regions as of 2013. FAST (Fast Emergency Vehicle Preemption Systems - Rapid Emergency Vehicle Preemption Systems) allows emergency teams to reach the scene faster than traffic lights. As of 2013, it is working in 40 regions and adjusting road signs. does not have direct contact, but with roadside hazard detection devices, drivers can be placed on rear-end collisions or road signs. These are scientific research projects in which signs on a certain route are adjusted and developed by the National Police Organization DSSS (Driving Safety Support Systems) by processing historical data about driving on devices in the vehicle and driving information from the transport infrastructure. transfers to the tool.

Another ITS application in Japan is the Smart Road project, which again aims to reduce traffic congestion. In this project, in cooperation with Japanese public institutions and private sector organizations, next-generation highways will be created using infrastructure-vehicle communication technology. As Figure.1 shows, this project was jointly implemented by Japan's National Institute of Land and Infrastructure Management and Japanese car manufacturers, which uses intelligent cruise control to control the smoothness of movement on rough road sections or slopes. provides. It is a system that helps drivers adjust the distance between vehicles. The project is also researching cashless payment transactions at locations such as parking lots where tolls are to be paid using sensors and transmitters called "AUS points" installed on the side of the road.

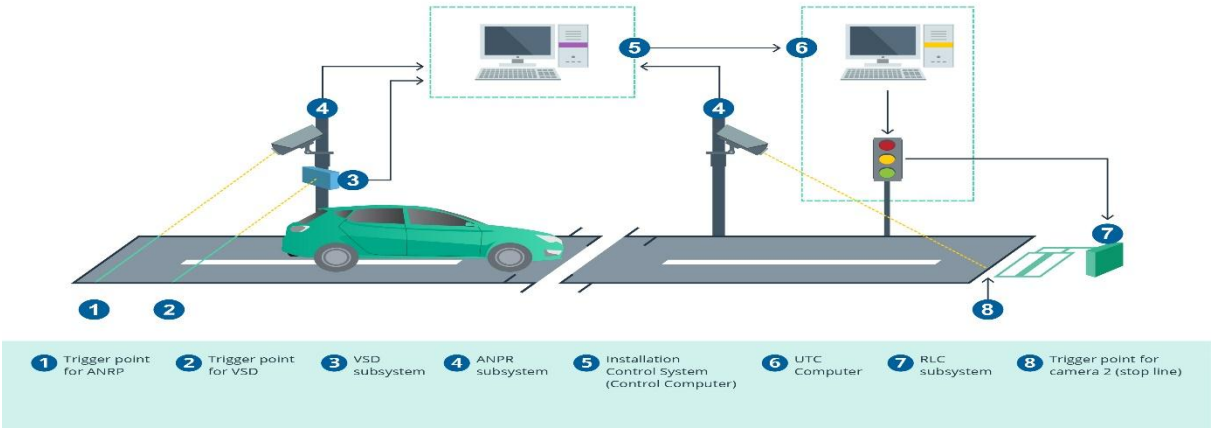

Figure-1. Smart road project Source : (HANAI, 2013, page 4)

AUS program is electronic is a payment system. In March 2001 across the country with this system being implemented for the first time 24 operators are unique system through car both on roads and intra -city highways wireless for toll collection uses communication. 2013 year as of now, 6.4 million vehicles use the system per day The number of imported cars is around 40 million. This from the system by using 210 thousand per year tons of CO2 emissions and traffic congestion by 30 % to reduce achieved calculated (HANAI, 2013, pp. 4-5).

Another project in this field is the ASV (Advanced Safety Vehicle) project, the first steps of this project began in 1991 with the deployment of DSSS technologies in vehicles in collaboration with the government, academia and industry. Finally, this project aims to deploy in-car technologies such as collision avoidance automatic braking, electronic stability program (ESP) and driver warning systems. In addition to the above-mentioned projects, the information reception system that supports the VICS project in Japan, where each vehicle sends information about its location, is also a great ITS application. The Ministry of Interior and Communications, which handles the frequency allocation and standard setting process for communication systems used in all of these applications, is continuing its research activities on DSSS systems operating in the 700 MHz

(Mega Hertz) frequency range used for vehicles. Work continues on higher- resolution systems that will allow cars to better see pedestrians and other vehicles on the ground. Another project involving truck manufacturers in Japan, which aims to move freight trucks together as a train, is working on an advanced intelligent cruise control system. Nevertheless, the central government is helping local governments with urban public transport systems, especially using smart parking and integrated microchip cards. ITS applications in March 2011 _ happen has been from an earthquake then 24 hours vehicular traffic on the internet within about information helped to exchange.

Cooperative AUS **vehicles are connected** to other vehicles (**V2V** : **Vehicle -** to -vehicle communication systems), road infrastructure (**V2I** : **Vehicle -** to -infrastructure communication systems), pedestrians (**V2P** : **Vehicle-to** -Pedestrians communication systems) connects with. enabling communication with roadside units (**V2R: Vehicle -to-Roadway** - Vehicle-Roadside Unit Communication Systems) and network (**V2N: Vehicle-to-Network - Vehicle-to-Network Communication Systems**) will give.

Figure 1 shows the basis of K-AUS application communication organize V2X communication _ types are shown. Using the K-AUS framework, V2X allows short -range (IEEE802.11p/DSRC) or cellular (3G, 4G, LTE-V2X, 5G) radio and application-to- application communication, depending on the type and state of the application. FM / DAB +) technologies, presented systems.

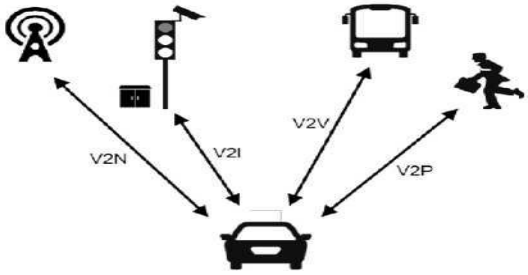

Figure-2. Types of V2X communication Source : (Analysys Mason, 2017)

- **V2V** services describe the exchange of data between two vehicles in close proximity to each other. V2V services are expected to be used mainly for security applications.
- **V2I** services describe data exchange between a vehicle and roadside stations or between a vehicle and an application server. V2I services provide information directly to vehicles. V2I services are expected to improve road safety, increase traffic efficiency and reduce energy consumption.
- **V2P** services describe the exchange of information between a pedestrian and a vehicle. V2P services are expected to be used primarily for security applications.
- **V2N** services describe the data exchange between the device and the application server. V2N services are expected to improve traffic safety and traffic efficiency and increase passenger comfort.

Together with the cooperative AUS, it is planned to provide connected and autonomous driving. Cooperative driving ensures coordination of actions between users and infrastructure. Connected driving enables the sharing of information between users and the infrastructure. With autonomous driving, the goal is for vehicles to take over the role of driver and become part of the transportation system. With different levels of autonomous driving and different levels of driver involvement, it is also conceivable that identification, decision-making and maneuvering skills will be fully transferred to the car. The levels of autonomous driving start at level zero and go up to level five, which is fully autonomous.

Level 0: No Automation: The driver does all the work. Responsibility is human.

Level 1: Driver Assistance: The vehicle assists the driver in steering or speeding in various situations. Responsibility is human.

Level 2: Partially Autonomous: The vehicle takes full control of the steering and speed in various situations. Responsibility is human. The driver must always be ready to take control.

Level 3: conditional autonomous: the car controls the steering and speed. The responsibility lies with the autonomous system.

Level 4: Highly Autonomous: The vehicle controls every detail. The responsibility lies with the autonomous system.

Level 5: Fully Autonomous: The car does everything a human can do. The responsibility lies with the autonomous system.

CONCLUSIONS

In conclusion, change in the way travel demand is formed and generated The "agent" of this change, which is examined in this paper, is Technology. Technology which is impendent everywhere, "ambient", user friendly, and above all more and more available in every aspect of every day life. İt can be said that the connectivity of transport means with other elements is very important.

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