INTELLIGENT INTERNAL AND EXTERNAL SYSTEMS OF CARS AND THEIR IMPROVEMENT

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Abstract
This article provides information and relevant recommendations about cars, their internal and external systems, their improvement, future cars, their useful features..

Key words: ABS (anti-braking system), ESP (electronic stability position), (ACC) - adaptive cruise control, (FCW) – function of collision warning, (LDW) - lane departure warning, GPS, GLONASS

INTRODUCTION

Today, most of us cannot imagine our life without cars. Vehicle technology is improving day by day. A smart car will benefit society, especially in terms of safety and efficiency. The benefits come with its smart car system, such as self-driving system, smart headlights, self-parking, car-to-car, communication technology and adaptive cruise control. [1]
The self-driving system reduces the level of accidents and increases the comfort of driving. Most of the accidents today are caused by driver error. For example, using the phone, drinking alcohol and drugs, and not following traffic rules. The use of self-driving systems reduces the rate of traffic accidents, especially for drunk and drug-impaired drivers.[1-2]

MAIN PART

Systems based solely on information from a smart vehicle are called internal or autonomous. They can also be called closed systems. Today, active safety enhancement systems are widely used in cars and trucks. These are systems such as ABS (anti-braking system), ESP (electronic stability position) - to increase stability), Brake Assist - a system to assist the operation of the emergency braking mechanism, as well as (ACC) - adaptive cruise control. (adaptive cruise control), forward collision warning (FCW) - collision warning systems, lane departure warning (LDW) and blind spot detection (BSD), etc.
The blind spot detection system BLIS (Volvo) consists of video cameras with a speed of 25 frames per second installed in the exterior rear mirrors and a computer that recognizes vehicles entering this space, each measuring 3x9.5m. In the event of a dangerous approach, the system turns on a yellow LED in the passenger compartment - next to the right or left window,

respectively. At the same time, many internal (closed) systems can serve as useful sources of information for the external infrastructure. [3]

ESP (Electronic Stability Control) activation can signal slippery road surfaces and this information is useful to other road users and road services. The vehicle itself is an important source of information that can serve many other purposes (city traffic management, highway management, etc.). In addition to the information obtained from the vehicle itself, the information stored in the memory of the smart vehicle can also be used. (Digital card on CD (DVD), data arrays stored in car computer, etc.).

The production and distribution of goods in the modern world depends mainly on the organization of efficient and economical logistics chains of goods transportation, especially in terms of delivery of goods, outside the European Union and restrictions. It is the main tool for effective management of electronic data between government agencies and stakeholders in real-time logistics chains, especially when crossing borders. Its technologies are of great importance for providing real-time information on the status of cargo and transported products and the status of transport goods (especially dangerous goods and animals) and for logistics of freight transport.

Half of the traffic accidents in Japan involve pedestrians and cyclists. Such accidents mostly happen in places where there are not many pedestrians or on narrow roads and intersections, where the driver's visibility is limited. In Japan, research has been conducted on a system that detects the position of a pedestrian using a mobile phone equipped with GPS navigation, as well as the position of a car with a navigation system, and warns the driver of the presence of pedestrians near the route. A cellular communication system was used to transmit signals. The server receives signals from mobile phones and cars, calculates their relative position and transmits the processed data to the car's navigation system and warns the driver. The driver receives a warning on the display and a voice message about the presence of a pedestrian. Information about the state of transport. In addition to navigation systems, the described information systems should be taken into account. As part of these systems, the vehicle receives information about the current state of traffic. Satellite navigation systems allow precise calculation of the location coordinate, speed and direction of various objects. Also, the effectiveness of the cellular communication system is based on high-precision time TDMA (time division multiple access channels) and CDMA (code division multiple access channels). increases the synchronization of systems. Since the beginning of the 1990s, 2 satellite navigation systems have been operating: the global navigation satellite system GPS (USA) and GLONASS (Russia). GPS and GLONASS navigation systems provide information on location, speed and time (Position, Velocity, Time, PVT) to an unlimited number of subscribers on the ground, in the air and at sea in any weather conditions. Both systems were originally created for military purposes, but later they were made available to people and are

now considered dual-purpose systems. Satellite navigation systems consist of 3 main segments: space segment, ground control segment (control complex) and subscriber receivers (user segment). All satellites are controlled by the ground control system. The navigation area is monitored, the status of the satellites is monitored, they are controlled and the navigation data is updated. GNSS (Global Navigation Satellite Systems) technologies can provide great opportunities for determining the location of vehicles, people, cargo and objects. Location is the key information for automation and systems interaction, making GNSS a technology that enables many of ITT's capabilities. Today, GNSS helps drivers navigate the roads and is an integral part of automotive management. Many vehicles are equipped with GNSS receivers. The basic technology is well developed, but the development potential is high, the construction is not expensive and can be integrated with other devices. Devices are easy to find ready-made and inexpensive. Thus, GNSS will become an important source of information for determining the location of transport vehicles in the future. [4-5]

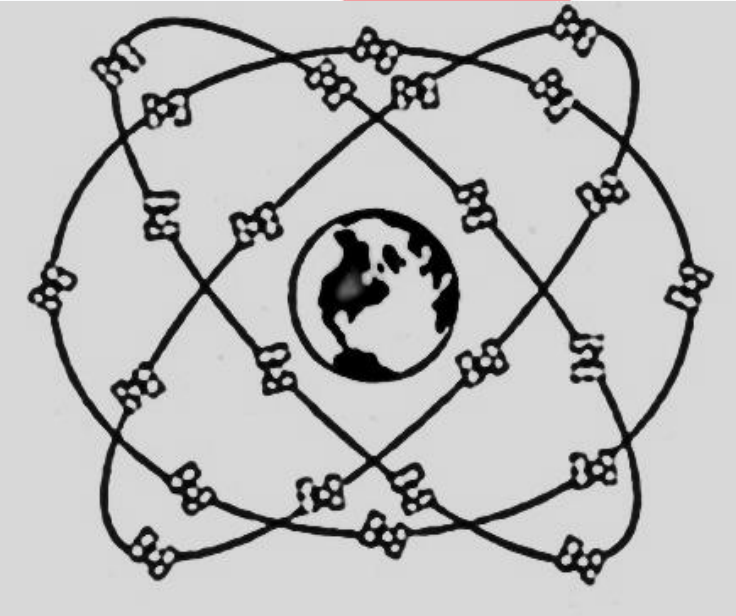

Figure 1. Satellites of the Glonass orbital group

GLONASS - Global satellite navigation system. It was developed by order of the Ministry of Defense of the former Union. Currently, the Russian satellite navigation system. The basis of the system is 24 satellites, moving in three orbital planes above the surface of the Earth at an altitude of 64.8 ° and 19,100 km. The main principle of using the system is that the location is determined by measuring certain coordinates of the distance from the satellite to the moving vehicle. The GPS time of the signal sent from the distance satellite is calculated by the time received by the antenna. That is, to determine the distance in three-dimensional coordinates, the GPS receiver must know the time of the GPS system and the distance to at least 3 satellites. In this way, signals from at least four satellites are used to determine the coordinates and

altitude of the receiver. Geostron is one of the most famous Russian companies producing satellite monitoring systems for mobile devices using GPS and Glonass technologies. The interface of their programs is simple and understandable. It is also possible to get traffic directions from the system for a certain period of time, as well as to create necessary reports. For many transport companies, transporting goods over long distances is a very serious and complicated process. Drivers are always faced with unexpected weather conditions and unforeseen problems on the road. In such cases, the GLONASS/GPS monitoring system helps users to make the right decision and choose the best route, as well as monitor the situation along the route.[5]

The system determines the coordinates with an accuracy of up to 100 meters, but the accuracy can be increased to 20 meters using differential methods. Another difference between BeiDou 1 and GPS is the way coordinates are determined. The navigator in the Chinese navigation system is not only a receiver, but also a signal transmitter. The monitoring station sends a signal to the user via two satellites. After receiving the signal, the user device sends a reply signal with two satellites. Based on the signal interruption, the ground station calculates the geographical coordinates of the user, determines the height from the existing database and transmits the signals to the user segment device.

GNSS technologies can provide great opportunities for determining the location of vehicles, people, cargo and objects. Location is the key information for automation and systems interaction, making GNSS a technology that enables many of ITT's capabilities. Today, GNSS helps drivers find their way on the roads and is an integral part of management in car factories. Many vehicles are equipped with GNSS receivers. The basic technology is well developed, but the development potential is high, the construction is not expensive and can be integrated with other devices. The devices are easy to find off-the-shelf and inexpensive. Thus, GNSS will become an important source of information for determining the location of vehicles in the future. Positioning capability requires the vehicle to be equipped with a GNSS receiver. Also, for location information to be useful, the vehicle must be equipped with location-related information, generally maps. With such information, the vehicle can plan its route. However, for location information to be useful, vehicles must communicate with each other, with local transportation infrastructure and global information infrastructure. In addition, together with other sensors (radar, camera, inertial sensor, wheel sensor), it can provide enough information for a semi- or fully automated vehicle. [6]

CONCLUSION

In the future, smart cars will be able to drive autonomously and connect to the Internet, thereby sharing network access with passengers. In addition, through it, certain parameters can be accessed using devices located inside the car and remotely. In a word, with the help of

intelligent internal and external systems of future cars, not only environmental damage will be prevented, but also the safety of pedestrians and drivers will be guaranteed.

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