УЛУЧШЕНИЕ СИСТЕМ ОПРЕДЕЛЕНИЯ МЕСТОПОЛОЖЕНИЯ ТРАНСПОРТНОГО СРЕДСТВА

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Аннотация. Региональный уровень транспортной телематики предназначен для сбора и обработки информации об участниках дорожного движения (транспортных средствах, пассажирах, пешеходах), состоянии дорожной инфраструктуры, метеорологической обстановке, расположении технических средств организации дорожного движения и для последующего управления дорожным движением на основе критериев безопасности и эффективности транспортного процесса.

Ключевые слова. Дорожная инфраструктура, метеорологическая обстановка, передняя панель, AVL (система определения местоположения автомобиля), глобальный, населенные пункты, местоположение автомобиля, инверсный подход, PIN-код.

IMPROVEMENT OF VEHICLE LOCATION DETERMINATION SYSTEMS

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Annotation. The regional level of transport telematics is designed to collect and process information about road traffic participants (vehicles, passengers, pedestrians), the condition of road infrastructure, meteorological conditions, the location of technical means of organizing road traffic, and for subsequent traffic management based on the criteria of safety and efficiency of the transport process.

Keywords: Road infrastructure, meteorological situation, front panel, AVL (Autotactic Vehicle Location system), global, populated areas, Vehicle location, Inversive approach, PIN code.

Introduction Improvements in automobile design led to increased engine power, increased speed, and an increase in the number of vehicles. In addition to environmental information, the driver needed information about the operating mode of the units and the entire vehicle: the availability of fuel and technical fluids, the current speed of movement, etc. This information began to be displayed on the devices on the front panel of the car. The second stage in the development of information technologies was the introduction of a radio receiver into the car, with the help of which it became possible to receive important information related to road traffic in a timely manner: road closures, major traffic accidents, dangerous weather and climatic phenomena, etc.

Automatic vehicle location systems - AVL (Autotactic Vehicle Location system) - calculate the coordinates of a vehicle in groups of similar vehicles as it moves within a certain area.

According to the coverage area of the system, the following coverage areas can be distinguished:

- global, covering the globe, continents or territories of several countries;
- regional, as a rule, limited to the borders of settlements, regions, regions;
- local - designed for small-radius traffic (city, regional territory), which is characteristic mainly for remote tracking and search systems for stolen cars.

A network of control zones is created by using a sufficient number of control points to determine the location of a moving object within the city.

The location of a vehicle is determined as it passes through the areas of influence of these points.

Figure 1 below presents a classification of location detection methods.

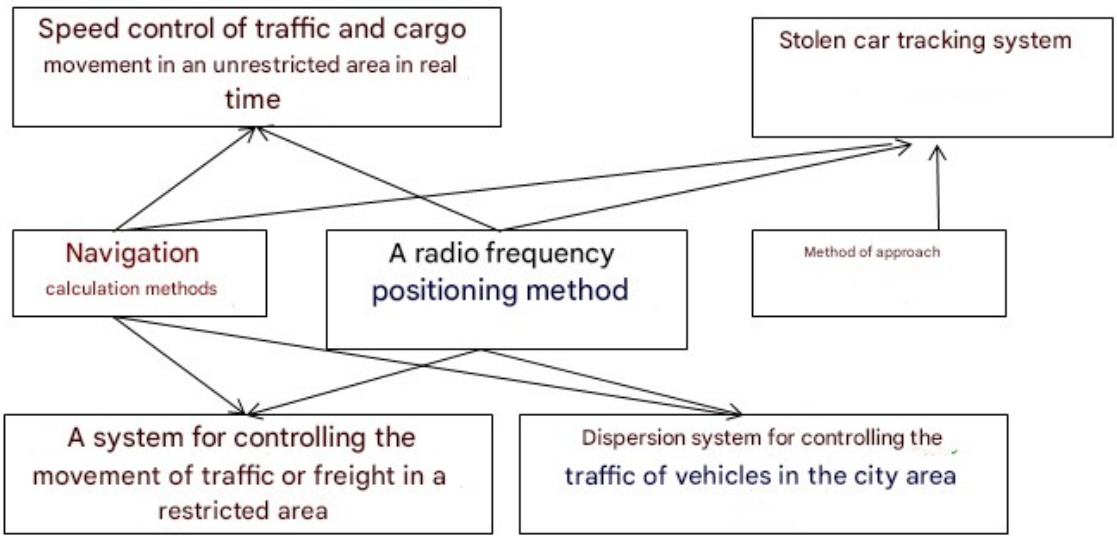

Figure 1 - Classification of positioning methods.

Systems based on approximation methods

In this case, the personal code of each checkpoint is transmitted via a radio channel to the vehicle's on-board equipment, which, in turn, transmits this information, as well as its identification code, to the control and data processing subsystem through the information transmission subsystem.

Thus, the correct approximation method is implemented.

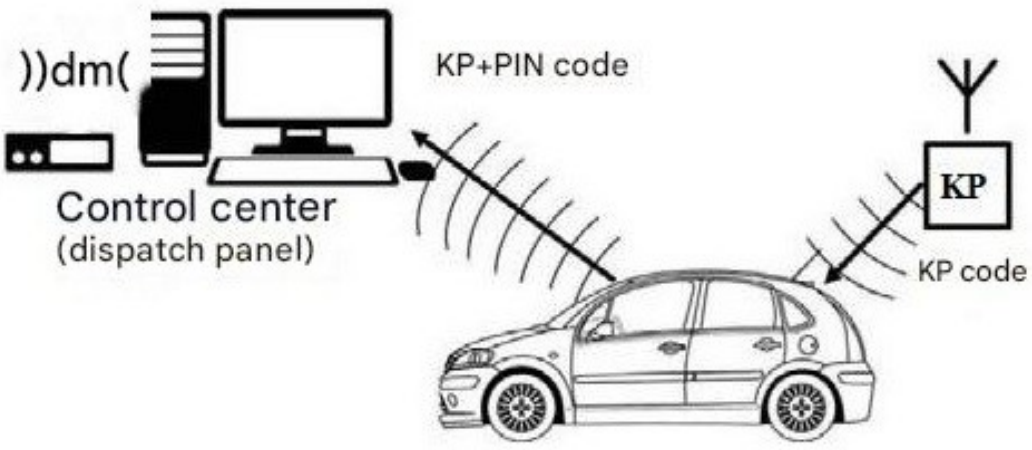

Figure 2 - Correct approach.

However, in practice, the reverse approach method is often used, with the detection and recognition of vehicles being carried out using active, passive or semi-active low-power radio beacons installed on them, which transmit their

personal code to the checkpoint receiver, or using optical equipment to read and recognize the characteristic features of the object, for example, vehicle license plates.

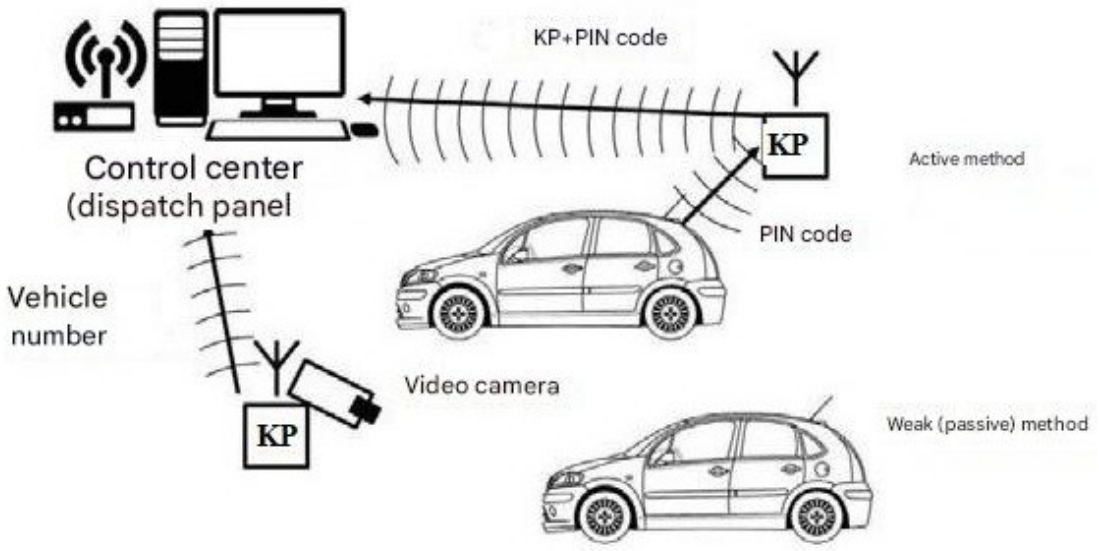

Figure 3 - Inverse approximation methods.

The information received from the control points is then transmitted to the data management and processing subsystem.

The accuracy of location determination and the frequency of data update directly depend on the density of the control points in the system's operating area. Since proximity methods require a developed communication infrastructure, they are very expensive to build systems covering large areas. At the same time, reverse proximity methods allow you to minimize the size of on-board equipment - a radio beacon - or to work without equipment installed on the car. The main application of these systems is to provide comprehensive security for cars, and to ensure the search in case of theft.

Conclusion: The development of vehicle location determination systems plays a crucial role in modern transport telematics. Various methods, including global, regional, and local tracking approaches, ensure accurate vehicle positioning and efficient traffic management. While proximity-based systems offer precise location tracking, they require extensive infrastructure. In contrast, reverse proximity methods minimize on-board equipment, making

them cost-effective for security and theft recovery applications. The integration of advanced detection technologies, such as radio beacons and optical recognition, enhances the reliability and efficiency of these systems. Future improvements should focus on optimizing infrastructure costs while maintaining high accuracy and real-time data updates.

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