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THE ROLE OF INFORMATION TECHNOLOGIES IN REGULATING FUEL CONSUMPTION IN MOTOR TRANSPORT

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Abstract
The increasing demand for sustainable transportation solutions has necessitated the development and implementation of advanced information technologies (IT) to regulate fuel consumption in motor transport. This paper explores the pivotal role that IT plays in enhancing fuel efficiency, reducing emissions, and promoting economic savings within the transport sector. Key technologies such as telematics, GPS tracking, big data analytics, and intelligent transportation systems (ITS) are examined for their contributions to monitoring and optimizing fuel use. The integration of these technologies enables real-time data collection and analysis, providing actionable insights for fleet management and individual vehicle operation. Case studies from various regions and industries illustrate the practical benefits and challenges associated with adopting these technologies. The findings suggest that while IT-driven solutions significantly improve fuel management, successful implementation requires overcoming barriers related to cost, technological complexity, and user acceptance. Ultimately, this research highlights the transformative potential of information technologies in achieving more sustainable and efficient motor transport systems.

Keywords: car, GPS, fuel, mobile communication.

Introduction

Up to now, high results have been achieved by wide and comprehensive implementation of the information monitoring system in many fields. In particular, in the automobile industry, it is being introduced in issues such as control and management of vehicle performance indicators.

The rapid advancement of information technologies (IT) has revolutionized various sectors, including motor transport. As the world faces mounting environmental challenges and economic pressures, the transportation industry is under increasing scrutiny to enhance fuel efficiency and reduce carbon emissions. Fuel consumption in motor transport is a critical factor influencing both operational costs and environmental impact. Therefore, leveraging IT to regulate and optimize fuel use has become a focal point for researchers, policymakers, and industry stakeholders.

In recent years, a range of sophisticated IT solutions has been developed to address these challenges. Technologies such as telematics, global positioning systems (GPS), big data analytics, and intelligent transportation systems (ITS) offer unprecedented capabilities for monitoring, analyzing, and managing fuel consumption. These tools enable real-time tracking of vehicle performance, driver behaviour, and route efficiency,

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providing valuable insights that can lead to significant fuel savings and emissions reductions.

This article aims to explore the multifaceted role of information technologies in regulating fuel consumption within the motor transport sector. By examining the current state of IT applications, evaluating their effectiveness, and discussing the practical challenges of implementation, we seek to provide a comprehensive understanding of how these technologies can contribute to more sustainable and efficient transportation systems. Through a combination of theoretical analysis and case studies, we will highlight the potential benefits and barriers associated with IT-driven fuel management strategies [1,2,3].

The Main Part

Monitoring of transport from satellite or GPS— traffic object monitoring is built based on satellite navigation systems, devices and mobile communication technologies, satellite traffic monitoring is used to manage cargo transportation and auto park (aggregate) systems, and solve transport logistics issues.

Figure 1. GPS/GLONASS module device.

The GPS/GLONASS module allows you to accurately determine the direction, location and speed of movement of an object based on a large number of data received by GPS and GLONASS satellites, as well as transfer data to wireless networks of mobile operators. The received data is analyzed and sent to the dispatchers in the form of text and cartographic information [4].

Vehicle monitoring software allows you to:

- monitoring of the current state of transport on the map;
- consider the change of route direction during the selected time interval;
- control of adherence to the route and changes in the direction of traffic.

In addition, various reports allow you to get accurate information about the distance travelled by a particular vehicle, fuel consumption, idle time and the total distance travelled by the vehicle. Additional information can be obtained by installing various sensors connected to the GPS controller in the vehicle: fuel level sensor, TS axle load sensor, refrigerator temperature sensor, and other similar sensors.

The use of satellite monitoring systems increases the quality and efficiency of the work of corporate transport, allows to control of fuel theft and the use of transport for other

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purposes, and at the same time, the cost of the vehicle fleet can be reduced by 20% on average. -25% reduction.

The main feature of the software included in the "Vehicle Traffic Monitoring and Control System" service is to receive a large number of data from GLONASS or satellite GPS through GLONASS and GPS devices, and provide the dispatcher with fast and up-to-date information about the vehicle's work process. is considered to provide the possibility of data transmission. Connecting to the monitoring system is done by connecting to the web server with any computer, tablet or mobile phone. The GPS system stores data for two years and allows you to download information in various formats [5,6].

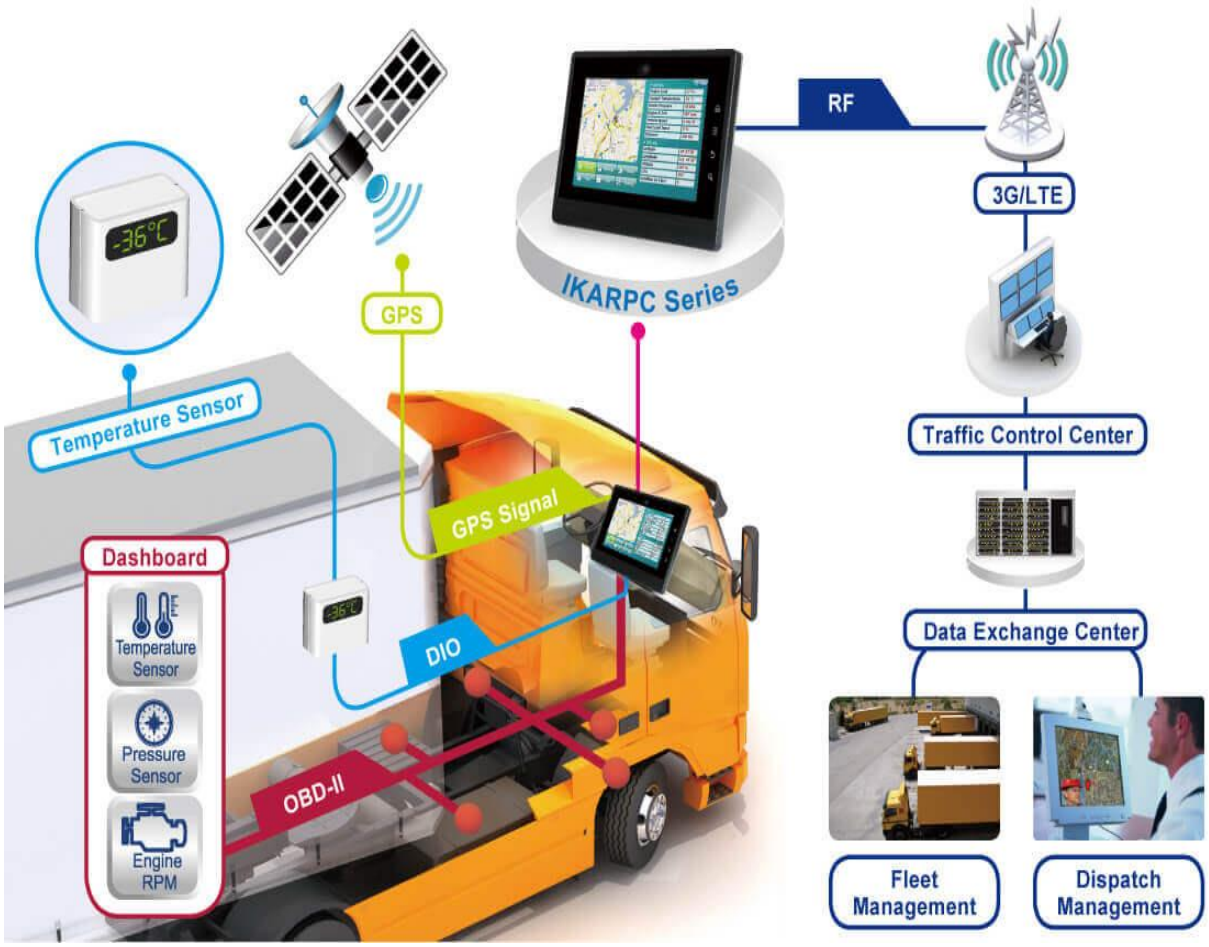

Figure 2. Vehicle traffic monitoring and management system

The device is able to save information for two years. It is possible to view the direction of all vehicles in motion on the map or for any reporting period of the vehicle fleet, as well as the direction and speed of the vehicle, by selecting a period of time.

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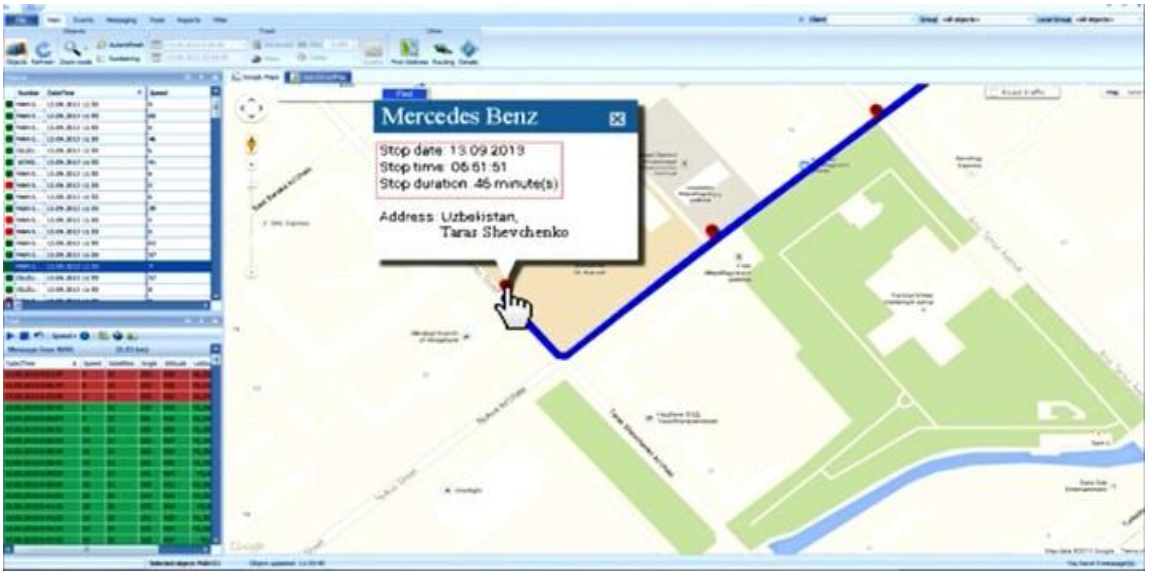

Figure 3. Control of vehicle parking, loading, idling

The system allows you to monitor parking lot locations and time at loading or unloading locations, as well as vehicle idle time and total time on the road. It is possible to view detailed addresses of the route travelled.

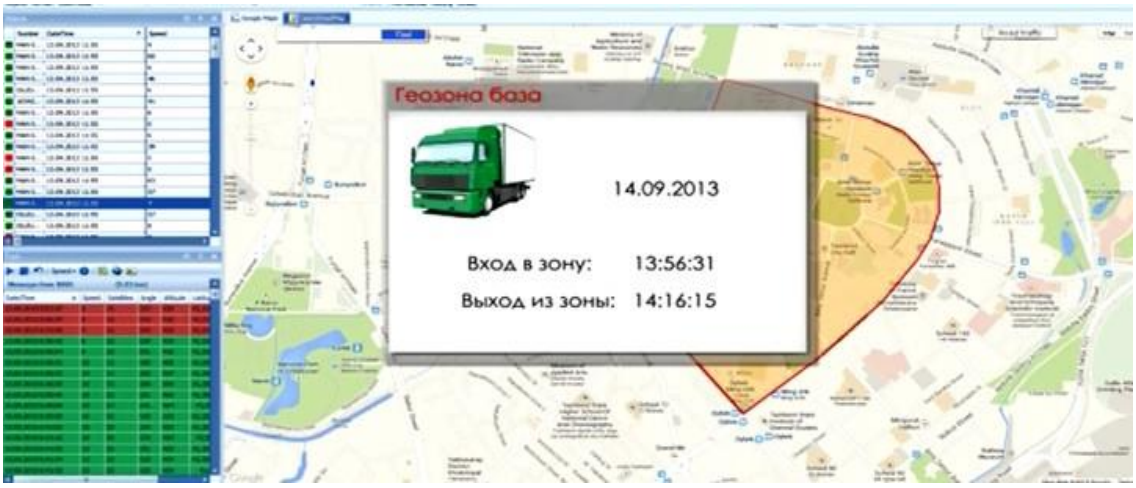

Figure 4. Geofencing access control

GPS monitoring systems can monitor the actual route of a particular vehicle, day and night. It is possible to get information about the travelled way for any reporting period. Any object on the map can be freely marked with their name and address. A detailed report on the selected objects, and information about the time, number and duration of visits can be received as a message in SMS or e-mail upon arrival and departure to the object.

Control of fuel consumption can be carried out both by mathematical calculation of the travelled distance and by "motor clock" sensors, as well as by the indicator of fuel

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consumption level sensors installed in the tank of the vehicle with high accuracy. The GPS control system also offers great opportunities in combating the situation of low fuel filling at gas stations, monitoring the amount of fuel filled by the gas stations and the driver, as well as showing the amount of intensive consumption in litres, in addition, transmits alarm information in case of refuelling and theft [].

Implementatio1n of GPS vehicle monitoring and management systems will help enterprises to shorten business processes, and avoid negative situations such as fuel and cargo theft, as well as situations where the vehicle is used for other purposes. allows.

Figure 5.

It is no secret that information technologies are developing day by day. Accordingly, various information technologies are used to determine the fuel consumption of cars. For example, fuel consumption is determined using the GPS system, wialon program and electronics, and devices.

Such methods are now widely used in automobile companies and organizations. This method shows the fuel consumption of the car but does not determine the fuel consumption rate.

Conclusions

The integration of information technologies in regulating fuel consumption within the motor transport sector represents a significant step towards achieving greater efficiency and sustainability. This study has highlighted the transformative potential of IT solutions, such as telematics, GPS tracking, big data analytics, and intelligent transportation systems, in enhancing fuel efficiency and reducing emissions.

The evidence presented demonstrates that these technologies provide comprehensive tools for real-time monitoring and optimization of fuel use. By leveraging data-driven insights, fleet managers and individual drivers can make informed decisions that lead

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to substantial fuel savings and operational improvements. The practical examples and case studies discussed illustrate the tangible benefits of adopting IT-driven fuel management strategies across various regions and industries.

However, the successful implementation of these technologies is not without challenges. Issues such as high initial costs, technological complexity, and the need for user training and acceptance must be addressed to fully realize the potential of IT in this domain. Collaboration between technology providers, transport operators, and policymakers will be crucial in overcoming these barriers and promoting widespread adoption.

In conclusion, the role of information technologies in regulating fuel consumption in motor transport is pivotal for advancing towards a more sustainable and efficient future. Continued innovation and investment in these technologies, along with supportive regulatory frameworks, will be essential in maximizing their impact. By embracing these advancements, the motor transport industry can make significant strides in reducing its environmental footprint and operational costs, contributing to broader global efforts to combat climate change and promote economic sustainability.

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