THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF ROAD TRANSPORT IN THE REPUBLIC OF UZBEKISTAN

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Abstract: This thesis discusses the issues of digitization of the road transport sector in the Republic of Uzbekistan and the introduction of artificial intelligence technologies in it. The work analyzes the current state of the transport system, existing problems in traffic flow management - traffic density, static operation mode of traffic lights, outdated infrastructure, and inconsistency of information systems.

The author demonstrates the potential of artificial intelligence in traffic management, ensuring road safety, analyzing traffic flow in real time, automatically controlling car parks, and reducing environmental burden.

The study highlights the practical importance of artificial intelligence using the examples of the "Smart City" and "Intelligent Transport System (ITS)" projects being implemented in the cities of Tashkent, Samarkand, and Bukhara.

As a result, it is argued that the widespread implementation of artificial intelligence technologies is an important factor in optimizing the transport system of Uzbekistan, increasing safety, ensuring economic efficiency and environmental sustainability.

Key words: artificial intelligence, road transport, digitalization, traffic flow, smart traffic light, ITS system, smart city.

Introdution.

n recent years, the Republic of Uzbekistan has been implementing large-scale reforms aimed at digitizing the transport sector and creating environmentally friendly and efficient transport systems. Road transport is one of the most important sectors of the country's economy, accounting for a large part of the volume of freight and passenger transportation. Therefore, the introduction of modern technologies, including artificial intelligence solutions, in road transport management is of strategic importance.1]

Artificial intelligence technologies provide broad opportunities for optimizing the transport system, improving road safety, analyzing passenger flows, and automating vehicle maintenance processes. These processes are identified as one of the key areas within the framework of Uzbekistan's "Digital Economy" strategy and the "Automobile Transport Sector Modernization Program".

Currently, there are a number of problems in the system of managing and analyzing traffic flows in Uzbekistan.

The main problems in traffic flow management are related to the outdated technical infrastructure, the lack of integration of information systems, and the lack of artificial intelligence-based analysis.

The following measures are important to eliminate them. Solutions such as integrating transport data into a single digital platform, widely introducing smart traffic lights and video

analytics systems, strengthening specialist training and scientific research, and introducing real-time analytics and artificial intelligence into transport control centers have been provided.[2]

Currently, there are a number of problems with traffic density and traffic light operation in the cities of Uzbekistan. First of all, the traffic flow is unevenly distributed throughout the city - as a result of the majority of drivers using central roads, there is excessive traffic congestion in some areas, and slow traffic in others. One of the factors that exacerbates this situation is the weakness of traffic monitoring systems and the lack of modern sensor, camera and analysis systems.

The city's infrastructure has also not kept pace with the growth in the number of cars, and the public transport system is not working efficiently enough. The lack of parking spaces also reduces the width of the road, artificially increasing traffic congestion.

Traffic light systems also have serious shortcomings. Most traffic lights still operate in a static mode, that is, they do not adapt to the real state of traffic flow. “Smart traffic light” systems have only been introduced as a trial on some central streets, and their number is not sufficient. In addition, due to the lack of synchronization between traffic lights, drivers are forced to stop at every intersection, which increases fuel consumption and environmental burden.

- ✓ Artificial intelligence is being used in the road transport system in several main areas:
- ✓ **Traffic flow management and analysis.**
- ✓ **With the help of artificial intelligence, traffic density, traffic light operation mode, and high-risk accident points are determined in real time. This allows reducing traffic jams and increasing the efficiency of road use.**
- ✓ **Fleet management.**
- ✓ **For large transport enterprises, AI-based programs automatically monitor the technical condition of vehicles, fuel consumption, and maintenance schedules.**
- ✓ **AI-based camera systems monitor traffic flow, detect violations, and automatically transmit data to administrative systems. This reduces the human factor and makes control transparent.**

Uzbekistan's road transport transports millions of passengers and thousands of trucks annually. In recent years, the increase in the number of cars on the roads has led to an increase in traffic congestion, road accidents, and environmental problems.

Therefore, the introduction of artificial intelligence technologies provides the following advantages:

- ✓ **Transport system optimization: effective route planning, increased time and fuel efficiency.**
- ✓ **Safety: reducing the human factor through accident risk prediction and warning systems.**
- ✓ **Environmental protection: reducing waste through traffic flow management.**
- ✓ **Economic efficiency: leading to cost reduction and improved service quality for transport companies.**

Today, work has begun on digitizing traffic systems in Tashkent, Samarkand, and Bukhara based on the “Smart City” concept. Through the “Intelligent Transport System (ITS)” project in

Tashkent, traffic lights, road signs, and cameras are being connected to a single center. This center uses SI algorithms to analyze traffic congestion in real time and make appropriate management decisions regarding traffic flow.

Also, in our country, integrated transport monitoring systems with GPS and IoT technologies are playing an important role in ensuring road safety. In the future, the concept of "smart roads" will allow managing the entire transport system on a single digital platform by establishing information exchange between vehicles and infrastructure.

Conclusion

Artificial intelligence plays a strategic role in the modernization of Uzbekistan's road transport sector. It will not only ensure road safety, but also improve the quality of transport services, ensure rational use of resources, and reduce the environmental burden.

In the future, the following measures should be taken to further develop artificial intelligence technologies:

- ✓ Integration of the transport database;
- ✓ Expansion of personnel training and scientific research;
- ✓ Adaptation of international experience and technologies to national conditions;
- ✓ Creation of digital control centers in road transport infrastructure.

The widespread introduction of artificial intelligence into the road transport system will serve as an important factor in developing Uzbekistan towards a digital economy and forming a stable and safe transport system.

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