

# GENERAL ISSUES OF IMPLEMENTATION OF INTELLECTUAL TRANSPORT SYSTEMS IN THE CITIES OF UZBEKISTAN

<sup>1</sup>Dilshod E. Eshmuradov, <sup>2</sup>Bahodir A. Ergashov

<sup>1</sup>Associate Professor of Tashkent State Technical University, Uzbekistan, Tashkent

<sup>2</sup>Doctoral student of Namangan Institute of Engineering and Construction, Uzbekistan,  
Namangan

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**Abstract.** *This article highlights the goals of introducing intelligent transport systems. Opinions and relevant conclusions are given about the problems that may arise during the implementation of this system, the measures required to eliminate them.*

**Keywords:** *Intelligent transport systems, smart traffic lights, smart parking lots, car detectors.*

## 1. Introduction

Intelligent transportation systems refer to the application of advanced technologies to transportation systems to improve safety, efficiency, and sustainability. Intelligent transportation systems technologies include automation, sensing, communication, and data analytics to monitor and control various elements of transportation systems, such as vehicles, roads, and infrastructure.

Intelligent transport systems include a wide range of innovations, including providing drivers with the information they need to drive safely, vehicles connected to intelligent traffic management and integrated traffic services. These technologies make it possible to transport goods and people, reduce accidents, prevent congestion and maintain highways in a satisfactory condition.

Implementation of intelligent transport systems requires cooperation between government agencies, private entities, industrial organizations and academia. Due to the sharp increase in the number of cars, accidents and traffic jams will also increase. Under the influence of these factors, countries around the world are recognizing the advantages of intelligent transport systems. Various measures have been taken to support the development and implementation of such systems. As technology continues to advance, intelligent transportation systems will continue to play a critical role in the future of transportation, helping to create safer, more efficient, and sustainable transportation systems around the world.

The number of cars in the Republic of Uzbekistan has increased dramatically in the last 10 years. Correspondingly, the constant monitoring of car accidents and traffic jams on the streets has also increased. According to statistics, the number of traffic accidents in 2021 was 1082, the number of injured was 891, and the number of deaths was 194. This is a very negative indicator. There are several ways to prevent these situations and reduce congestion. Experts from European and Asian countries with developed transport systems say that the most effective of these is the introduction of intelligent transport systems [1].

## 2. Materials and methods

It will be appropriate to introduce intelligent transport systems in the most populated cities of Uzbekistan. For example, the cities of Tashkent, Namangan and Samarkand are the cities with the largest population and the most crowded streets. In these cities, such systems perform tasks such as reducing traffic congestion, optimizing public transport routes, and providing immediate information to drivers and passengers about the road situation. Judging by foreign experiences, intelligent transport systems have been introduced on highways in Russia in the form of toll roads. Their goals were to increase the level of traffic safety, reduce operational costs of roads and increase the time of keeping them in a satisfactory condition. The efforts made for this paid off 100%.

Smart roads should be able to provide solutions for collecting and processing data about vehicles and road infrastructure. The following technical tools are required for this.

Transport flow detectors:

Traffic flow detectors allow to collect statistical data on the intensity of traffic flow, to analyze the traffic situation and to find possible solutions for the efficient distribution of traffic flows to the experts of operating organizations.

In addition, it performs tasks such as identifying motor vehicles, classifying them into categories by size, analyzing the speed of movement of moving vehicles by lines and directions.

Vehicle detectors record the number of vehicles passing in a given lane. This information is necessary for the implementation of adaptive regulation, calculation or automatic selection algorithms of motion control software.

Smart traffic lights:

The principle of operation of the system is based on the ability to dynamically control signals. This leads to an increase in the throughput of intersections. The system consists of controllers, cameras and remote traffic sensors that analyze the situation at intersections in real time, evaluate the level of traffic and transmit this information to the central management server. Transmission is carried out by means of radio communication or optical communication lines. After receiving new data, the central server sends a certain command to the traffic light controllers, which means that the green or red traffic light is turned on in a certain way to reduce the time spent by the cars at the intersections. For example, when there is a traffic jam on one of the highways, the system extends the duration of the green light of the traffic light in order to prevent traffic jams. In addition, the smart traffic light can predict the traffic situation 15-30 minutes ahead. This allows you to adjust its operation by choosing a more effective strategy for controlling the flow of cars. In the event of an accident at intersections, immediate changes to the plan are made. Its main task is to increase the productivity of intersections [2].



**Figure 1.** smart traffic light

Automatic correction of traffic violations:

Earlier, the State Road Traffic Safety Inspection recorded only violations on highways. But from January 1, 2021, it was established that by attaching videos from any video recording device, including security cameras and mobile phones, it will be possible to report a violation and receive a reward in the appropriate manner.

Electronic means of continuous toll payment:

Until recently, public transport fares were paid in cash, monthly travel cards (including for pupils, students and pensioners at preferential rates) and tokens. At the same time, the certificates that give the right to travel for free in the city public transport have also been introduced.

The current system does not provide full transparency regarding the total number of passengers transported by public transport, preferential fares and free use, and passengers who paid in cash and tokens.

Starting from 2020, in order to improve the quality of transport services to the population by introducing modern information and communication technologies in the transportation of passengers in public transport, to ensure transparency in the collection of fares, and to further improve the system of passenger transportation in public transport Implementation of the "automated system of fare payments for public transport" has begun.

Within this system, single transport cards for public transport, a mobile application for making payments, and one-time QR tickets have been introduced. These cards can be purchased at sales points, agency networks, metro stations, bus stations, railway ticket offices, and airports.

Also, in this system, it is possible to pay for the fare by contactless bank cards (Humo, Uzcard, Visa, Mastercard, etc.).

It was decided that the price of single transport cards will not be that much. (Cards are intended for long-term use). It is possible to carry out card calculations through funds on bank plastic cards, ATMs, kiosks, filling terminals and mobile applications.

### **3. Results and discussion**

For pensioners, students and special categories of citizens who have the right to use the public transport service on a preferential basis in accordance with the law, the personalization of preferential transport cards and the sale of the card at the cost of the card will be carried out through state service centers.

Through this system, convenient tariff plans, determined by time and distance, have been introduced, allowing the use of several types of transport or transport with one payment. In this case, the passenger had the opportunity to choose the tariff plans convenient for him to use several modes of transport until reaching the destination within the specified time.

The introduction of the automated system of payment of fares for passenger transportation in public transport is being implemented step by step.

Smart parking lots:

The creation of special parking lots began at the same time as the appearance of the first cars. With the number of cars growing at a rapid rate, modern technologies have been introduced to solve the problem of limited parking. The main direction of development is the "smart" parking sensor. Such sensors are installed on the road in parking lots and monitor the occupied or vacant space above them, transmitting data to the general system. Using such a network of sensors, a map of the parking lot is created, its status is transmitted to users on the streets using special screens or a mobile application.

Smart parking is a necessary element of urban infrastructure today, and smart parking allows people to find free spaces quickly and easily. A system will be created that will make it easy to see exactly where to find available parking spaces and how long each space is occupied. Using low-cost sensors and smartphone-enabled payment systems, smart parking applications can collect real-time traffic data that operators, drivers and local authorities can then use to effectively manage traffic and parking. . It also allows people to reserve a parking space in advance or find a parking spot at all. Comprehensive smart parking helps reduce vehicle emissions in cities by reducing parking time and enables efficient parking management in the city [3].

#### **4. Conclusions**

In order to introduce intelligent transport systems, it is necessary to implement the listed technical means step by step. This creates a number of conveniences for our citizens. Ambulances and fire engines arrive at the scene sooner, passengers are not stuck in traffic jams for hours, and car accidents are reduced.

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