

TRAFFIC OPTIMIZATION IN THE CITY OF URGENCH: INTELLIGENT TRAFFIC MANAGEMENT SYSTEMS

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Annotation. Urban traffic jams are an urgent problem, especially in the context of the city of Urgench in the Khorezm region of Uzbekistan. To solve this problem, it is possible to implement intelligent traffic management systems (ISMS), which offer modern solutions for optimizing the flow of transport.

Keywords. Transport infrastructure, Urgench, Khorezm region, traffic jams, public transport, bicycle paths, electric transport, intelligent traffic management systems, bicycledparking, multimodal transport hubs, traffic lights, carpooling, sustainability, ecology, mobile applications, efficiency.

Introduction

A review of the analysis of the transport infrastructure in Urgench points to the need for systemic changes to improve mobility and reduce traffic jams. Below is a brief overview of the analysis performed [1]:

1. Traffic problems (there are significant problems with transport infrastructure, including frequent traffic jams, long public transport intervals, and limited travel options).
2. The need for Efficient Public Transport (stressed the need to expand and improve public transport to reduce dependence on private cars);
3. Infrastructure problems for cyclists (insufficient conditions have been found for cyclists, which makes it difficult to use this eco-friendly mode of transport);
4. Inefficient Traffic Management (there are problems in traffic management, such as inefficient use of traffic lights and lack of an intelligent control system);
5. The need for Green Solutions (stressed the importance of moving to green vehicles and reducing emissions);
6. Public participation (the importance of involving the public in the decision-making process and providing feedback is highlighted);

7. The need for Technology Integration (pointed out the need to integrate modern technologies, such as intelligent traffic management systems and mobile applications);
8. Sustainable Development (highlighted the need to integrate sustainable practices into transport infrastructure to reduce environmental impacts).

Experimental Research

The implementation of ISMS (**Intelligent Traffic Management Systems**) begins with the systematic collection and analysis of traffic data. Using advanced technologies such as sensors and cameras, the system gets a real picture of the current traffic situation.

1. Traffic light optimization:

ISUT allows you to dynamically adjust traffic lights depending on the volume of traffic flow. This makes traffic more efficient and prevents traffic jams at intersections.

2. Providing up-to-date information to drivers:

Traffic management systems can integrate with mobile apps and road signs, providing drivers with up-to-date information about the current road situation, allowing them to choose the most optimal routes.

3. Traffic monitoring and prediction:

ISPs can use machine learning algorithms to monitor traffic trends and predict possible traffic jams. This allows the system to take measures in advance, minimizing the likelihood of congestion.

4. Interaction with the public:

The implementation of ISUT also includes educational programs for drivers and pedestrians to improve their understanding of traffic optimization principles and reduce possible problems during the transition to the new system.

5. The future of sustainable transport:

The development of ISPs can also support the transition to sustainable transport, including electric and hybrid vehicles, as well as public transport. The introduction of intelligent traffic management systems in Urgench can lead to more efficient use of road infrastructure and significantly reduce traffic jams, improving overall mobility in the city.

6. Introduction Of Smart Parking:

ISPs can integrate with smart parking systems, providing information about available parking spaces. This reduces the time spent searching for parking and reduces the load on the roads.

7. Infrastructure Improvements:

Together with the ISUT, the need for infrastructure changes is being considered, such as the construction of bypass roads, the expansion of road networks and the renewal of obsolete sections.

8. Centralized Monitoring:

Creating a transport infrastructure management center allows operators to monitor and respond to changes in traffic flow in real time, increasing the efficiency of the system.

9. Cooperation with the Private Sector:

The involvement of private companies in the development and implementation of ISPs can contribute to more innovative approaches and financing of projects to optimize transport infrastructure.

10. Environmental Sustainability:

Integration of ISPs can contribute to more efficient fuel use and lower emissions, making the urban transport system more environmentally sustainable.

11. Air Quality Monitoring:

ISPs can include sensors for monitoring air quality, which allows you to quickly respond to environmental problems and reduce the impact of transport on the environment. These additional steps will not only help reduce traffic congestion, but also create a more sustainable, integrated and comfortable transportation system in Urgench.

12. Development Of Cycling Infrastructure:

Encourage the use of bicycles in the city through the creation of safe bike paths and parking lots, which will help reduce congestion and improve the environment.

13. Creating Pedestrian Zones:

The development of pedestrian zones in the city center promotes more active pedestrian movement and can reduce the flow of road transport in limited areas.

14. Introduction Of Electric Transport:

Encourage the use of electric vehicles, including buses, taxis and private cars, which will reduce emissions and create a quieter and cleaner urban environment.

15. Flow Separation Systems:

Development of systems for separating traffic flows, such as dedicated lanes for public transport, which contributes to more efficient movement of buses and trams [3].

16. Support for Carpooling:

Encourage carpooling through the creation of special lanes for cars with multiple passengers and the provision of benefits for such vehicles.

17. Interactive Mobile Apps:

Development of mobile applications with real-time functionality that allow drivers and passengers to get up-to-date traffic information, offers on routes and public transport services.

Research Results

These measures contribute to the diversity of vehicles, improve the mobility of citizens and contribute to the creation of a more efficient and sustainable transportation system in Urgench [4]. The overall conclusion of the analysis suggests that the revision and improvement of the transport system in Urgench requires comprehensive measures, including the development of public transport, infrastructure for cyclists, effective traffic management and the active introduction of modern technologies.

1. Expansion Of Public Transport:

- Introduction of additional public transport routes, especially in densely populated areas.
- Increase the number of buses and trams to reduce passenger waiting intervals.

2. Creating Efficient Cycling Infrastructures:

- Construction of safe bike paths along major highways and along the city axis.
- Development of a bicycle parking system at major public transport hubs.

3. Electrification Of The Transport System:

- Replacement of old buses with electric ones, with a gradual transition to electrification of all public transport.
- Creation of zones for charging electric vehicles with the expansion of the network of charging stations.

4. Improvement Of Transport Hubs:

- Reconstruction and modernization of railway and bus stations to increase the comfort and attractiveness of passengers.
- Creation of multi-modal transport hubs for more convenient transfers.

5. Implementation Of Intelligent Traffic Management Systems:

- Installation of modern traffic light control systems that respond to the current load.
- Use machine learning algorithms to predict and prevent possible traffic jams.

6. Development Of Environmentally Friendly Vehicles:

- Support of programs for updating the city's fleet in order to replace outdated cars with more eco-friendly models.

- Organizing campaigns to encourage car owners to switch to electric or hybrid vehicles.

7. Creating Carpooling Programs:

- Development of special lanes for cars with multiple passengers on the main routes.

- Introduction of systems and platforms to facilitate the organization of carpooling among citizens [5].

These specific measures can be included in a comprehensive plan for the development of transport infrastructure in the city of Urgench, aimed at improving mobility and reducing traffic jams.

Conclusions

Implementation of a set of specific solutions for transport infrastructure in Urgench is an integral part of the strategy to improve the quality of urban life. Expanding public transport, creating efficient cycling and pedestrian infrastructures, electrifying the transport system, and implementing intelligent traffic management systems—all these measures are aimed at reducing traffic jams, improving the environment, and increasing the overall mobility of citizens. It is important to emphasize that these changes can bring significant benefits, such as reduced travel time, improved urban health, and reduced negative environmental impacts. The implementation of these measures requires a concerted effort by the city authorities, the private sector and active participation of residents, but the prospect of creating a more sustainable, intelligent and comfortable urban environment makes these efforts justified.

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