THE BENEFITS OF USING ARTIFICIALLY INTELLIGENT TRAFFIC LIGHTS

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Abstract: *The real problem of big cities is traffic jams, the transportation infrastructure does not respond to it, and the cost of spending and the emission of harmful substances into the atmosphere increase. There are two types of smart traffic lights that solve this problem: adaptive and neural network. They can work in several modes, and if necessary, switch to manual control.*

Key words and phrases: *smart traffic light, neural network, smart cameras, operating mode.*

ПРЕИМУЩЕСТВА ИСПОЛЬЗОВАНИЯ ИСКУССТВЕННО ИНТЕЛЛЕКТУАЛЬНЫХ СВЕТОФОРОВ

Аннотация: *Настоящей проблемой больших городов являются пробки, транспортная инфраструктура на них не реагирует, увеличиваются затраты на расходы и выбросы вредных веществ в атмосферу. Есть два типа умных светофоров, решающих эту проблему: адаптивные и нейросетевые. Они могут работать в нескольких режимах, а при необходимости переходить на ручное управление.*

Ключевые слова и фразы: *умный светофор, нейронная сеть, умные камеры, режим работы.*

Artificially intelligent traffic lights use cameras with radar, ultrasonic acoustic location sensors, and predictive algorithms to improve traffic flow. Smart traffic lights or Intelligent traffic lights are a vehicle traffic control system that combines traditional traffic lights with an array of sensors and artificial intelligence to intelligently route vehicle and pedestrian traffic[8]. A technology for smart traffic signals has been developed at Carnegie Mellon University and is being used in a pilot project in Pittsburgh in an effort to reduce vehicle emissions in the city. Unlike other dynamic control signals that adjust the timing and phasing of lights according to limits that are set in controller programming, this system combines existing technology with artificial intelligence.

The signals communicate with each other and adapt to changing traffic conditions to reduce the amount of time that cars spend idling. Using fiber optic video receivers

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[8] Smart' traffic signals cut air pollution in Pittsburgh". McCain, Inc. September 25, 2012. Archived from the original on October 10, 2013. Retrieved September 28, 2012.

similar to those already employed in dynamic control systems, the new technology monitors vehicle numbers and makes changes in real time to avoid congestion wherever possible. Initial results from the pilot study are encouraging: the amount of time that motorists spent idling at lights was reduced by 40% and travel times across the city were reduced by 25%[9].

In the United Kingdom, lights that changed to red when sensing that an approaching motorist was traveling too fast were being trialled in Swindon in 201, to see if they are more effective at reducing the number of accidents on the road than the speed cameras that preceded them and which were removed following a council decision in 2008. These lights are more focused on encouraging motorists to obey the law but if they prove to be a success then they could pave the way for more sophisticated systems to be introduced in the UK.

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 will turn on the green or red traffic light 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 in advance. 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.
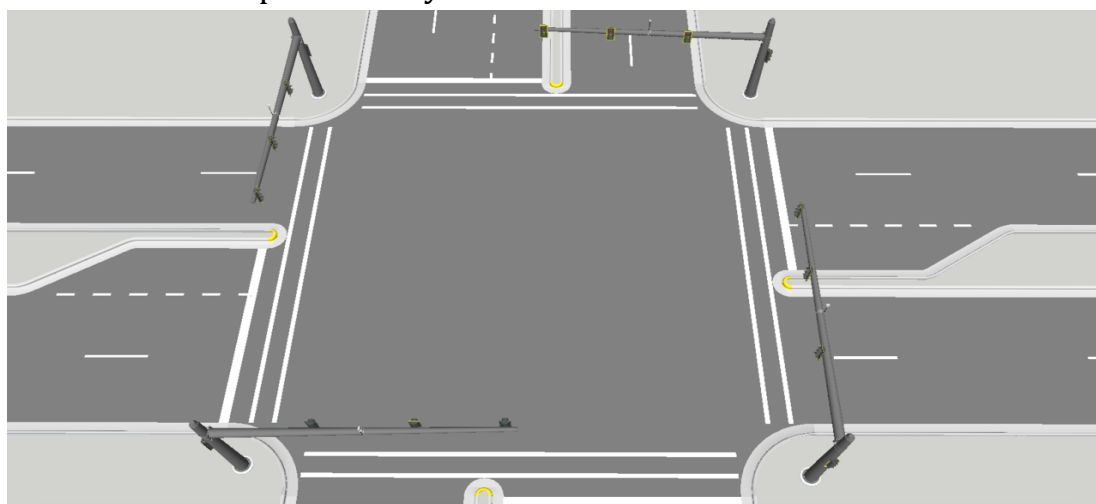
At the moment, one road lane in the city is able to serve no more than 1,800 cars per hour on average. In addition, the ideal situation is that the vehicle is always in

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[9] "Smart and Scalable Urban Signal Networks". 13 August 2016. Retrieved 7 November 2017.

motion, that is, it does not stop at intersections and does not encounter obstacles such as poor road surface, narrowing of the road, etc. Today, the increase in the number of cars requires a solution to the traffic problem in its various aspects, without which cities begin to choke on the exhaust gases of cars standing in traffic for many kilometers.

It is a system that promotes an efficient and effective way to manage urban traffic, improving motorists' driving experience while reducing traffic's negative impacts on the environment and quality of life. This smart traffic system uses advanced technology to manage the traffic flow efficiently. It uses artificial intelligence algorithms to analyze traffic data:

The smart traffic management system using internet of things allows the interconnectivity of the devices and systems using the internet, allowing them to share and collect data in real-time.

The traffic management system becomes smart using this next-gen technology and is designed to improve traffic flow, reduce travel time, and enhance road safety. This system can also be used to detect and respond to accidents incidents, and other emergencies, providing real-time information to emergency services and enabling faster response times.

Reducing Traffic Congestion: The primary objective of STMS is to reduce traffic congestion by improving traffic flow and reducing travel time. This can be achieved by optimizing traffic signal timings, routing traffic to alternate routes, and providing real-time traffic updates to drivers.

Improving Air Quality: The next major objective of this smart traffic management system is to reduce air pollution. It can be done by minimizing traffic congestion, idling, and stop-and-go traffic, which are major contributors to air pollution. By reducing congestion, STMS can also improve fuel efficiency and reduce emissions from vehicles.

Enhancing Road Safety: Another objective aims to enhance road safety by using cameras and sensors to detect accidents, hazards, and congestion. The system can then automatically alert drivers and traffic control centers to take appropriate actions, such as rerouting traffic or dispatching emergency services.

Enhancing Emergency Response: Another vital objective of intelligent traffic management systems for smart cities is to enhance the emergency response. It is possible by integrating with emergency services to provide real-time incident updates and coordinate emergency response efforts. This can help to improve incident response times and reduce the impact of incidents on traffic flow.

The real problem of big cities is traffic, especially in Uzbekistan, the number of cars is constantly growing, and the transport infrastructure is not ready for such an increase in traffic. This leads to a decrease in labor productivity, a deterioration of material and technical support, and a negative attitude of citizens to the government, which cannot cope with the situation. People's quality of life is not changing for the better, long hours in traffic, additional gas costs. In addition, the release of harmful substances into the atmosphere increases. From our material, you will learn about the principles of their operation, the advantages and disadvantages of various technologies and the experience of using them.

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