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Evaluation of Functional Efficiency of Automated Traffic Enforcement Systems

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Abstract

Traffic safety is a characteristic feature of road transport systems. Road traffic safety is regarded as a difficult challenge which requires a system approach to the management of the road traffic system and its functional features like variability of the structure of the street and road network and its technical condition, complexity of the hierarchical structure of road transport systems and technologies exploited in them. The research resulted in a model of functioning of automated traffic enforcement facilities and identified the factors which affect the effective functioning of automated traffic enforcement facilities which were used to develop the dependencies regarding the number of accidents to evaluate the effectiveness of traffic enforcement cameras.

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Keywords: Automated traffic enforcement system, traffic safety, mathematic model, correlation and regression analysis, functional efficiency.

1. Introduction

Reduction of traffic accidents in the RF road transport system is one of the main social priorities.

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The number of traffic accidents and the amount of the injured can be decreased by exploiting advanced IT and communications technologies and traffic management facilities [Government of the Russian Federation (2013)].

Here modern methods and technologies of traffic enforcement systems are becoming more urgent [Kerimov and Safiullin (2016)].

Therefore, this research is intended to study design solutions which can ensure efficient functioning of the automated traffic enforcement system.

The automated traffic enforcement system is regarded as a system with numerous parameters which can be represented in "input-output" terms as follows (Figure 1) [Kerimov et al. (2015)].

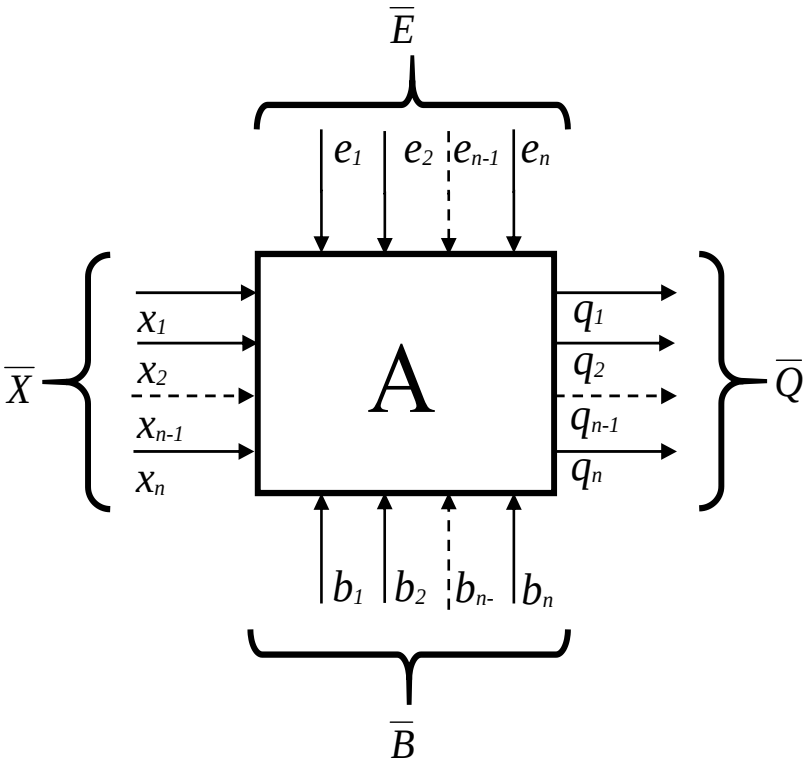

Fig. 1. Functional model of automated traffic enforcement system.

A vector function of controlled parameters $\overline{X}$ operates at the input of the system. This group of factors includes geometrical characteristics of the sections of a street and road network and specific features of traffic flows [Kerimov et al. (2015)]. Another combination of inputs represented by a vector function $\overline{E}$ includes factors related to the performance characteristics of the traffic enforcement facilities and driving etiquette. The vector function of uncontrolled parameters $\overline{B}$ can be interpreted as a normal mode interference of stochastic nature [Kerimov et al. (2015)]. These parameters include traffic conditions, technical characteristics of vehicles, etc. The output process can be defined by a multi-dimensional vector $\overline{Q}$ which indicates the functional quality of facility. Here the functional quality means the capacity of a traffic enforcement system to perform its intended functions at a given level for a certain period of time.