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PREDICTING TRAFFIC ACCIDENTS METHODS IN URBAN PLANNING

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The relevance of the research topic

Every year, road traffic accidents (RTAs) in urban lead to the death and injury of road users, as well as significant material losses not only to users but also to the road network. There are different reasons for this phenomenon, but one of the main factors is the insufficient consideration of the road's network formation attributes depending on urban planning conditions, which leads to poor perception of the "visibility triangle" by drivers and pedestrians.

This problem become increasingly relevant, therefore, identifying the causes of RTAs and addressing prevention issues are important scientific research topics.

Modern information technologies are the most important factor in the development of both the modern science and education system and means of ensuring safety of people. Using computer technologies creates fundamentally new opportunities not only in obtaining knowledge and skills to prevent RTAs, but also in their prediction.

Developing methods for predicting the number of RTAs will make it possible to reduce their number through advance forecasting, taking into account the framework of the road network. Using the models for predicting the number of RTAs will enable:

▪ the comparison of theoretically calculated forecasts and actual statistics
▪ tracking the number of RTAs
▪ analyzing the growth or decline rates of their numbers with respect to the factors affecting the outcome indicator (number of cars and the population of a particular city, region or country)

The goal of the research:

The goal of this research is to explore methods for reducing accidents in cities while considering their urban planning component. Accordingly, the following tasks will be performed in my work:

- Analyze the current regulatory framework regarding methods for studying road accidents in urban planning;
- Investigate the current state of the road network in terms of its accident rate and identify the main factors that affect it;
- Formulate the main problems and consider typological variations of orientation when using the street-road space (physical and psychological parameters of streets and roads in settlements);
- Study the main parameters of elements in the street-road network that affect the urban environment and lead to road accidents;
- Develop a methodology for reducing accidents in cities, taking into account the needs of road users and the urban planning component.

The subject of the research:

The subject of the research is methods and algorithms for developing forecasts of the number of road traffic accidents in urban planning. Among them may be mathematical methods for assessing the risks and probabilities of road traffic accidents based on historical data.

In addition, the subject of the research may be various mathematical models used for predicting road traffic accidents, such as:
- Statistical models based on the statistical analysis of data on road traffic accidents, factors affecting them, and the conditions under which they occur.
- Mathematical models based on various mathematical methods and approaches, such as probability and statistics theory, system theory, game theory, artificial intelligence, etc.
- Hybrid models that combine different mathematical methods and approaches.

Research methods

In this research, following research methods will be used:
- Literature review: studying various methods for predicting road traffic accidents in urban planning, their advantages and disadvantages.
- Statistical analysis: investigating statistical data on road traffic accidents, such as the number, location, time, and conditions under which they occur. Based on this, factors that affect accidents can be determined and forecasting models developed.
- Mathematical modeling: developing mathematical models for predicting road traffic accidents in urban planning. This approach may include the application of various mathematical methods, such as probability theory, statistics, systems theory, game theory, artificial intelligence, and others.
- Interaction analysis: studying the interaction of different factors that affect road traffic accidents in urban planning and their interrelationships. This may involve analyzing the interaction of factors such as road surface conditions, traffic flow, weather conditions, driver behavior, and other road users. Based on such research, comprehensive methods for predicting road traffic accidents can be developed.

■ Simulation modeling: developing computer models that simulate road conditions and traffic flow. This approach can help identify the most critical locations on the roads and develop effective measures to reduce the number of road traffic accidents.

All of these methods can be used to investigate and predict road traffic accidents in urban planning. Combining different research methods helps to obtain more accurate and reliable forecasting results.

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INNOVATIONS IN CONSTRUCTION

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Innovative technologies allow bringing the construction economy to a higher level (simplify and accelerate the construction process, reduce its cost, increase the life cycle of the building, ensure energy saving, etc.). Low construction and environmental costs play an important role in innovation, as they distinguish new technologies from existing ones.

Much of the innovation comes from the production of building materials. The construction materials market received unique products in 2019-2020.

The Netherlands has developed self-healing concrete. There is cement that can be reduced by lactic acid calcium and some bacteria that process it by converting it into limestone that fills cracks and prevents it from growing. It saves time for repairs, increases the life of the building.

Quartz Vinyl floors are developed which are fire- and water-resistant, and which contain quartz sand. With the addition of plasticizers, the tile becomes flexible.

German specialists created innovative material (liquid wood) from polymers and ground wood. Wood is used as wood flour and makes up 70% of the bulk of the composite. The composition may not be wood, in the material can add straw, rice husk, foam. If the composition includes antimicrobial components,