

## **Abstract**

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Model of pedestrian safety management in Intelligent Transport Systems as an part of the Smart City concept

The implementation of the Smart City concept is a response to the development challenges of managing urban areas nowadays. The concept of Smart City is a relatively new issue, but from the very beginning it has an interdisciplinary nature, based on both technical and social aspects, and interest in this subject is observed in various environments. The Smart City implementation process is multi-stage and requires intensive involvement of various public institutions, city administrations, enterprises and communities. The result of the integration of individual entities should be a coherent and synchronized system integrated with technological Solutions. Due to the role of transport in the functioning of modern socio-economic systems, there is an intensification of activities in supporting urban mobility by implementing the Smart City concept in the transport sector. Striving to achieve Smart Mobility requires local authorities to pursue a specific transport and mobility management policy in urban areas. Solutions contributing to the creation of Smart Mobility are to be a response to the existing transport problems, resource consumption, and improve mobility, the quality of life and health of city residents. Currently, the vast majority of Solutions supporting road users are focused on the priority treatment of drivers. Nevertheless, vulnerable road users are most vulnerable to the effects of road accidents.

Taking up this topic was supported by a literature review, unstructured observations and interviews with specialists and experts in the field of innovation, implementation of the Smart City concept, road traffic management, urban logistics and transport safety. Taking these actions resulted in the detection of a methodological gap consisting in the lack of a step-by-step approach and the lack of detailed procedures in the implementation of the Smart City concept, taking into account the safety of pedestrians in road traffic.

Based on the identified research gap, the following main hypothesis of the dissertation was formulated: the application of the integrated urban transport system management model may contribute to the improvement of pedestrian safety. The main purpose of this dissertation is to develop a model for the implementation of the smart city concept, taking into account the safety of vulnerable road users. The structure and logic of this dissertation are related to a specific research issue, objectives, hypotheses and the proposed method of own research. The dissertation consists of 5 chapters and is theoretical and empirical.

The first chapter presents the issues of city management. By emphasizing the significance of the Smart City concept in the development of cities contained in the auxiliary hypotheses, an

attempt was made to analyze its definition by various environments. The final part of the chapter focuses on the benefits of using compatible telematics Solutions for the implementation of Intelligent Transport Systems that fit into the Smart Mobility concept. The third chapter presents the issues of pedestrian safety in contemporary urban transport systems. Based on the case study, the activities of the practical implementation of Solutions for the improvement of the functioning of transport systems and the promotion of pedestrian safety in road traffic were indicated. Chapter four focuses on the assessment of intelligent systems implemented in urban transport networks on the need to raise the level of pedestrian safety. The first part of the chapter presents innovative proposals for Solutions used by European cities that determine the increase in safety and the improvement of pedestrian traffic. Then, based on the research carried out using the Delphi method an approach was developed in which priorities were agreed in the construction of transport systems focused on pedestrian safety, taking into account the implementation of the Smart City concept. The last chapter of the dissertation focused on the development of a pedestrian safety management model using Intelligent Transport Systems in Smart City. Using the Aimsun Next software, a microsimulation model of the traffic volume in a traffic summit was developed based on real data. In addition, an original path for the evolution of urban transport systems has been developed, referred to as Smart Mobility 4.0, taking into account the increased role of pedestrians in transport networks. Based on the above research, a generalized model for the implementation of the smart city concept was presented, taking into account the safety of vulnerable road users.

Conducting the research process and obtaining gradual results allows for the verification of research hypotheses in the dissertation and the implementation of the set goal, which was to develop a model for the implementation of the smart city concept, taking into account the safety of vulnerable road users.