Abstract

The dissertation concerns the development of new algorithms for data processing, analysis and evaluation for non-stationary weighing systems for vehicles in motion. In light of the growing problem of overloaded vehicles that have a detrimental effect on road infrastructure and traffic safety, the author focused on increasing the precision and reliability of the measurements made by these systems, especially in the context of changing environmental and operational conditions.

The main objective of the research was to develop advanced algorithms for processing signals from sensors installed in the road surface, load cells and induction loops. The presented algorithms facilitate the efficient recognition of overloaded vehicles in traffic, which is a key aspect in the implementation of WIM systems for administrative purposes. The author has investigated a number of techniques for processing data from these sensors, including approaches based on signal analysis and machine learning algorithms.

The paper presents the results of the study, which show that the developed methods significantly improve the accuracy of identifying overloaded vehicles and facilitate the automatic triggering of administrative procedures without the need to stop vehicles. Furthermore, the paper presents the potential use of WIM stations for administrative purposes.

The conclusions of the paper indicate that the development of WIM algorithms and technologies, combined with the integration of these systems into traffic management infrastructures, can significantly reduce the occurrence of overloaded vehicles on roads. This, in turn, can directly reduce infrastructure damage and increase traffic safety. The author emphasises the need to develop and implement such systems taking into account specific environmental variables, including temperature, pavement condition and variability in traffic dynamics.