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Processing and analysis of accelerometer data for the task of recognizing the state of the surface by mobile platform

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ABSTRACT

This work proposes an overview of the existing methods of data processing, which could be used for the objective of surface defects identification. Described algorithms were tried on real test datasets. Further research suggests the application of the most suitable approaches in autonomous mobile platforms projects.

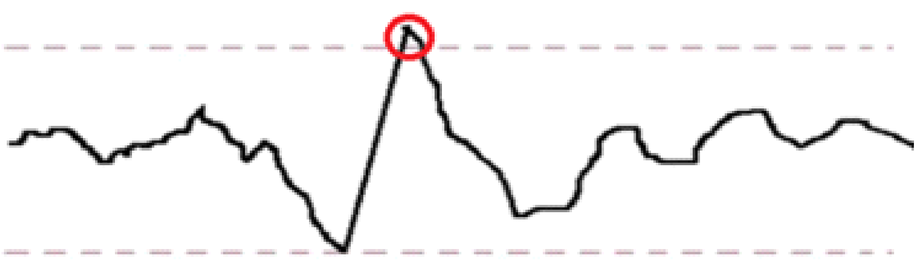
INTRODUCTION

Surface state monitoring is a difficult and complex issue. Using of static methods and tools is relatively expensive and seems unsuitable in case of huge area monitoring. Mobile platforms may help in this situation.

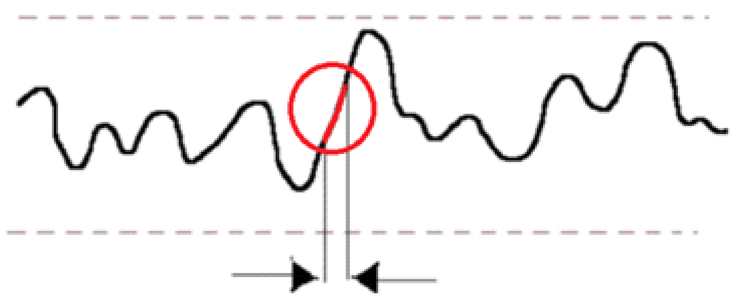
METHODOLOGY

One of the most important sub-objectives is a choice of the proper algorithm for surface defects identification.

Z-THRESH is one of the simplest algorithms, which could be used for the road defects identification.



Z-DIFF – a more advanced type of algorithms for road defects identification. This method is also based on Z-axis data processing. The classification function of the Z-DIFF algorithm is a border filter.This function performs a classification of the difference between two subsequent values.



G-ZERO is an algorithm for surface defect identification. During the experiments, it was discovered that in a moment of passing dump or crack values of the accelerometer demonstrate definite dynamics. This algorithm is based on this fact.

RESULTS AND DISCUSSION

Implementation of described algorithms has provided an opportunity to perform testing with real data, which were collected by Bosch BMA 280 accelerometer. Each of the described algorithms has demonstrated advantages and disadvantages.

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