

Software and hardware solutions for the road surface state classification

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ABSTRACT

The research contains an overview of the author's own vision of possible hardware and software methods which could be applied in the field of the road surface defects identification. Approaches described in the research work were experimentally tested in real conditions.

INTRODUCTION

From the first sight road, quality data analysis may seem relatively trivial task. However, this area contains subtasks that are not obvious, but require attention. The author has encountered with the need to solve such subtasks personally.

METHODOLOGY

According to the author's opinion, subtasks in the research can be divided into two groups. The first group - tasks related to the hardware part. The second group is the tasks associated with the software part. ESP32 controllers [1] (Image.1) and MPU6050 sensors (Image.2) were used as the main elements of the system. This hardware parts meet all the requirements imposed on them by the author of the project.



Image 1: ESP32

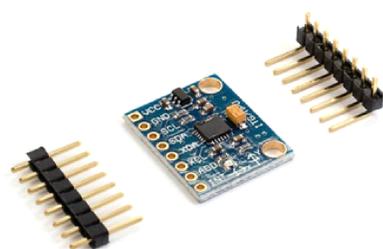


Image 2: MPU6050

RESULTS AND DISCUSSION

During the experiments, the main hardware elements of the system (ESP32 and MPU6050 sensors) were tested, the optimal positions for their installation on the platform were determined (Image.3).



Image 3: External part of the system

It should be noted that in the process of developing data analysis mechanisms, different algorithms were used, from such as the gradient descent method [2], to such as the Nelder-Mead method [3].

REFERENCE

- [1] ESP32 datashit. ESP32 datashit [online]. [cit. 2021-9-1]. Dostupné z: <http://esp32.net/>
- [2] KORN, Granino A. a Theresa M. KORN. Mathematical Handbook for Scientists and Engineers. Mineola: Dover Publications, 2000. ISBN 0-486-41147-8
- [3] NELDER, J. A. a R. MEAD. A Simplex Method for Function Minimization. The Computer Journal [online]. 1965, 7(4), 308-313 [cit. 2021-9-01]. ISSN 0010-4620. Dostupné z: doi:10.1093/comjnl/7.4.308

Turning to the second group of subtasks. Software related subtasks. More specifically, the solution of these subtasks determines how efficiently the filtration of useless data, the speed of analysis of the cleaned data and the quality of the analysis will take place.

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