

## REVIEW

over dissertation for acquiring educational and scientific degree “doctor”

Dissertation’s author: eng. Nikola Nikolaev Sabotinkov

**Subject:** “Research and management of safety systems in underground transport”

**Scientific area:** 5. Tehnical Sciences.

**Division:** 5.2. Electrical engineering, Electronic and Automation.

**Discipline:** 02.21.07 „Automated systems for information processing and management“.

**Supervisor:** prof. dr. Dimitar Nedelchev Karastoyanov — ИИСТ—БАС

**Jury member:** prof. dr. Lyubomir Dimitrov — ТУ— София

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### *Overview of dissertation*

The dissertation work has 111 pages, containing Introduction, five chapters, Conclusions, scientific and scientifically-applied contributions, references, originality declaration and publications. 50 literature references are quoted, 3 of them in cyrilic, 44 in latin and 3 internet sources. The dissertation is presented with 6 publications.

#### **1. Accuracy of the dissertation’s problem in scientific and scientifically-applied matter**

The topic of the dissertation is referred to actual and perspective field in modern solutions for reseach and management of protection systems in the underground transportation (metro) and increasing the parameters of the specific environment ( dusting, polution and air contents), as well as the increasing the safety of the users and service team.

Over this topic are made a lot of researches, not only in the developed countries, but the whole world. The gathered knowledge and theory in the literature, patents, models and practices in the existing systems highlight the actual and perspective opportunities of the problem solved.

#### **2. Problem and literature understanding degree**

A wide and detailed material overview is made for observing the European Union and world practices, existing new and innovatiove methods, technics and technologies for research and management protection systems in the underground transport. The presented material show deep understanding over the topic, what are the main problems in the field and the potential opportunities for their solving. Based on the research, dissertation task and goals are formulated.

#### **3. Congruence between the goal and tasks and the achieved results**

The PhD student’s analysis and conclusions over the theoretical studies in the developed countries, existing methods and means for examining the local environment and safety, gives the opportunity of examining and applying methods for their developing and application in the underground transport by solving dissertation’s task and goals. By applying innovative approaches a modern solutions for management of protection systems in the underground transportation are accomplished.

With well-formulated proved and motivated task and goals, the student achieved the dissertation conclusion and applied contributions. The results show that he has successfully choose research tools for accomplish new results with scientifically-applied contributions.

The formulated task and goals are presented as follows:

#### *Dissertation's task*

The main dissertation's goal is:

Research and optimisation of different innovative approaches for managing of protection systems in the underground urban transportation and increasing air quality and passenger's safety.

For achieving this goal the following tasks are summarised:

- To make an overview, analysis and systematisation of the types of factors interacting to the safety and the security in the underground railway transport,
- To examine the concentration of fine dust particles in the metro,
- To examine existing solutions for fine dust particles reduction and increasing the safety in the underground railway transport,
- To optimise underground spaces and tunnel's ventilation,
- To suggest innovative approaches in using modern protection system in the railway underground transport,
- To present experimental results and simulation modeling with new protection systems. The results to be analysed.

#### **4. Analytical characteristics and evaluating material's authenticity.**

The work is oriented towards solving real existing research in the field of protecting and maintaining the environment in the underground transport. The high concentration of fine dust particles is a reason for many diseases and respiratory problems over the world. Keeping the health and the safety of the passengers and the staff is important task. A method for tunnel ventilation is presented in the dissertation with the use of high-speed roller doors, mounted on the tunnel's entrances and exits in every station. A simulation modeling is carried out for determining the air flows in the tunnels and the stations. All this makes a good impression with deep knowledge about the problems and forming models over the dissertation. There is a relation between the theory and the experimental results. A plan for commercialisation of the results is presented.

The dissertation is structured as follows:

Introduction

Chapter 1. Overview, Analysis and systematisation of types of factors interacting with the safety and the security in the underground railway transport

Chapter 2. Existing solutions for decreasing the concentration of fine particles and increasing the safety in the underground railway transport

Chapter 3. Innovative approaches using modern protection systems in the underground railway transport

Chapter 4. Experimental results and simulation modeling with new protection systems

### **5. Scientific and scientifically-applied contributions in the dissertation.**

I accept and positively appreciate student's formulated scientific and scientifically-applied contributions in the dissertation and in the autoreferate. They can be categorised most appropriately as follows:

- Overview, Analysis and systematisation of types of factors interacting with the safety and the security in the underground railway transport, main pollution sources,
- Examining and analysis of existing solutions for decreasing the concentration of fine particles and increasing the safety in the underground railway transport,
- Presenting a scheme for optimising the ventilation in the metro and the tunnels, as well as modern protection systems in the underground railway transport,
- Presenting and analyzing of experimental results and simulation modeling with new protection systems.

### **6. Assessment of the degree of personal contribution of the PhD student in contributions.**

I believe that the dissertation work and its contributions are personally done by the PhD student in accordance with her supervisor and his team members.

### **7. Evaluation of the publications within the dissertation paper**

In addition with the dissertation, the PhD student presented 6 publications, 3 of which are made entirely by himself — 1 in English and 2 on Bulgarian language; 1 including team in English on international conference, 2 reported in local conferences.

There are no student's applications for intellectual property patents and quoted references.

Overall dissertation publications are reflecting the initial topic and the main experimental results. Because of the publications, the dissertation results has been presented to the scientific community.

### **8. Real use of the dissertation's results**

The student has accomplished a wide spectrum of work, showing knowledge, deep understanding and competence. The work detailed describes the innovative approaches and instruments, informatic, digitalisation and automation processes and their management related to increasing air quality and the safety in the urban underground transport.

### **9. Assessment of the autoreferate**

The autoreferate contain 44 pages and significantly reflects dissertation's contents. It respond to the desired format and present the desired and accomplished goal and tasks, the experimental results, the main scientifically applied contributions and present the main accomplishments of the paper.

## 10. Notes, advices and comments

The dissertation work makes good impression with deep topic knowledge, precision and desire for problem solving skills. The author has presented original scientifically-applied results, applied for increasing air quality and the safety in the underground transportation. This results reflect the desired goal and tasks in using innovative means, tools and technologies. The examined field is actual and scientificaly prespective for further development. The presented paper is a finished scientific work.

I had some comments for the PhD student, which he had corrected.

I advise the PhD student to prepare more author articles in international journals.

## CONCLUSION

The author has done deep analysis of the problem, has evauated the outcome experimental results and has presented a detailed solution in new and prespective area *All requirements of 3PACPE, the application manual, and the special requirements for desrving a PhD title in IICT-BAC are fullfiled, based on the volume and the quality of the dissertation paper. Based on that I positively evaluate the paper and suggest that mag. eng. Nikola Nikolaev Sabotinkov should graduate with educational title " Doctor" in Discipline: 5. Technical sciences, Division: 5.2. Electronic, Electrical engineering and Automation, Scientific Area: 02.21.07 "Automated systems for information processing and management".*

17.8.2019

Sofia

Signature..

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/prof. Dr. Lyubomir Dimitrov/