

REVIEW

From: **Prof. Dr. Roumen Trifonov** - TU-Sofia
Jury member by Order № 175/18.7.2019 from the director of ICT-BAS

over disertation for acquiring **educational and scientific degree**
“DOCTOR”

in scientific area: 5. Tehnical Sciences, professional division:
5.2. Electrical engineering, Electronic and Automation, scientific discipline: 02.21.07
„Automated systems for information processing and management“.

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

with disertation’s author: **eng. Nikola Nikolaev Sabotinkov, MSc.**

and scientific supervisor: **Prof. Dr. Dimitar Karastoyanov — ICT-BAS**

Overview of disertation

The submitted disertation work contains Introduction, five chapters, Conclusions, scientific and scientifically-applied contributions, references, originality declaration and publications, which is in volume of 111 pages. The reference is 50 literature quotations, 3 of them in cyrilic, 44 in latin and 3 internet sources. It is presented 6 publications about disertation work.

1. Accuracy of the disertation’s problem in scientific and scientifically-applied matter

The problem developed in the disertation is actual and refered to 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.

This topic is subject for many researches, in not only the developed countries, but also the whole world. The accumulated knowledge through 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

The literature overview of the dissertation give a wide and detailed view for the observing of the European Union and the world practices, existing new and innovative methods, technics and technologies for research and management protection systems in the underground transport. This chapter shows deep understanding of the area concerned, what are the main actual problems in the field, also and the potential opportunities for solving of the topic being developed. Based on the overview, there are formulated the goal and tasks of the dissertation work.

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

Following analysis and conclusions over the theoretical studies in the developed countries, existing methods and means for examining the local environment and safety, this gives an opportunity for development and implementation of methods for improving them in the underground transport by solving goal and tasks of dissertation work. The PhD. student realizes modern solutions for management of protection systems in the underground transportation by applying innovative approaches.

The real applied contributions is the positive in the dissertation work except well-formulated, proved and motivated goal and tasks. The results obtained in the dissertation show that he has successfully choose reasearch tools for acomplish new reults with scientifically-applied contributions.

The goal and tasks of the dissertation work are formulated as follows:

Dissertation work's goal

The main dissertation work's goal is:

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

To achieve this goal the following tasks are solved:

- To make an overview, analysis and systematisation of the types of factors interacting to the safety and the security in the underground railway transprot,
- 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 reults and simulation modeling with new protection systems. The results to be analysed.

4. Analytical characteristics and evaluating material's authenticity.

The dissertation work is related to 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. In the work a method for tunnel ventilation with the use of high-speed roller doors, mounted on the tunnel's entrances and exits in every station is proposed. A simulation modeling for detrming the air flows in the tunnels and the stations is realized. Together with this, it makes a good impression with deep knowledge about the problems and forming models, presented in the development. Between the theory and the experimental results received, there is a coincidence. A plan for commersialisation of the results has also been drawn up.

The material 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

Chapter 5. Comperative analysis of the 4 models

Potential results commersialization

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

The formulated from the PhD. student scientific and scientifically applied contributions in the dissertation and in the authoreferate I accept fully. The contributions can be categorised 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.

The dissertation work and its contributions I think that 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

There are presented 6 publications about the dissertation, 3 of them are made entirely by himself — 1 in English and 2 on Bulgarian language; 1 including team in English on international conference abroad, 2 reported in local conferences.

The publications about the dissertation reflect the main results of conducted research. Through this, the results of the PhD. student's work have become available to the scientific community in the country.

8. Real use of the dissertation's results

The PhD. student has done a large amount of work, distinguished by a wide coverage of knowledge, deep understanding and competence. The dissertation describes well 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 fully reflects dissertation's contents and is in volume of 44 pages. It corresponds to the desired format and reflects essentially to the goal and tasks, the experimental results, the main scientifically applied and scientific contributions, also and presents the main accomplishments of the scientific work.

10. Notes, advices and comments

It is visible from the dissertation work deep topic knowledge, precision and desire for interdisciplinary problem solving skills. The PhD student has recommend original scientifically applied results, applied for increasing air quality and the safety in the underground transportation. The results of the work reflect fully to the desired goal and tasks in using innovative means, tools and technologies. The scientific field which is examined, is actual and scientifically prespective for further development. The dissertation represents a completed research work.

I have one recommendation to the the PhD student, namely to target his publishing activities in international scientific forums with an Impact Factor or Impact Rank.

CONCLUSION

Eng. Nikola Nikolaev Sabotinkov, MSc has realized research work on the desired problem, has analyzed the outcome experimental results from the research and has presented a solution in new and prespective area.

All requirements of the law, its application manual, and the special requirements for deserving a PhD degree in ICT-BAC are fulfilled, based on the volume and the quality of the dissertation work.

On this basis, I positively appreciate the work and suggest to eng. Nikola Nikolaev Sabotinkov, MSc to be awarded educational and scientific degree "DOCTOR" in scientific area: 5. Technical Sciences, professional division: 5.2. Electrical engineering, Electronic and Automation, scientific discipline: 02.21.07 „Automated systems for information processing and management“.

22.08.2019

Sofia

Reviewer:

**NOT FOR
PUBLIC RELEASE**

/Prof. Dr. Roumen Trifonov/