

OPINION

by **Assoc. Prof. Nikolay Atanasov Shopov, PhD, Eng.**
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of a dissertation for the award of an educational and scientific degree “Doctor”

in: field of higher education 5 Technical Sciences,

Professional field 5.3. Communication and computer technology, doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)"

Author: M.Eng. Snezha Ventsislavova Shotarova

Topic: "Interactive laboratory for remote access information processing"

Scientific supervisor: Assoc. Prof. Dr Silvia Velkova Stoyanova-Petrova - Paisiy Hilendarski University

1. General presentation of the procedure and the doctoral student

By order No. RD-22-430/23.02.2026 of the Rector of Plovdiv University "Paisiy Hilendarski" I have been appointed as a member of the scientific jury in the procedure for the defense of a dissertation on the topic "Interactive laboratory for information processing with remote access" for the acquisition of the educational and scientific degree "doctor" in the field of higher education: 5. Technical sciences, professional field 5.3. Communication and computer technology, doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.) with the author of the dissertation M.Eng. Snezha Ventsislavova Shotarova. The set of materials on paper submitted by the doctoral student is in accordance with Art. 36 (1) of the Regulations for the Development of the Academic Staff of PU and PP of ZRAS in the Republic of Bulgaria. The doctoral student has attached 4 publications on the topic of the dissertation work.

MEng. Snezha Ventsislavova Shotarova completed her secondary education in 1993 at the Secondary Vocational Technical School of Light Industry and Mechanical Engineering – Dospat.

During the period 2015–2019, she studied at Paisii Hilendarski University of Plovdiv in the bachelor's program "Computer and Communication Systems", and in 2020 she graduated with a Master's degree in “Hardware and Software Systems”. From 01.03.2022 to 01.03.2025, she was a full-time PhD student at the Department of Electronics, Communications and Information Technologies at the Faculty of Physics and Technology, Paisii Hilendarski University of Plovdiv.

I have known M.Eng. Snezha Shotarova personally since 2023 through our participation in expert accreditation groups in professional field 5.3 “Communication and Computer Engineering” at the National Evaluation and Accreditation Agency to the Council of Ministers of the Republic of Bulgaria. I consider her an established researcher successfully developing in the field of computer and communication technologies, continuously improving her knowledge and skills.

2. Relevance of the topic

In recent years, there has been active work in the field of digitalization in the field of education, in particular in higher education. The development of modern technologies provides opportunities for interactive learning. Modern educational technologies - applications, models, simulations, etc. - engage the attention of students, stimulating them in the learning process. These technologies provide an opportunity for easier assimilation of the material with the possibility of remote access to educational resources. This leads to the need to develop interactive laboratories for processing information with remote access, for transferring real laboratory experiments to remote and interactive platforms. Thanks to the possibility of remote access, interactive laboratories expand the scope of learning and provide equal conditions for students, regardless of their location or access to physical resources.

The presented dissertation is aimed at the digitalization of education and corresponds to modern trends. I believe that the topic of the dissertation is relevant, interdisciplinary and corresponds to

modern trends, the problems solved in it have practical application. The development of an interactive laboratory with real equipment for processing information with remote access leads to support for the educational process and scientific research.

3. Knowing the problem

Doctoral student Shotarova cited 143 literary and information sources, all of which are in Latin. The bibliography includes titles of literary sources from 2004 to the present. It should be noted that more than 56% of the cited sources were published in the last ten years. After becoming acquainted with the applied scientific works of M.Eng. Shotarova, I believe that the developed ideas and the obtained results have become known to the scientific community in our country through publications and reports presented in scientific works and at conferences in our country and abroad.

From the list and analysis of the cited literary sources, it can be concluded that the doctoral student has gained insight into the current state and development trends of the problems addressed in the dissertation.

4. Research methodology

The dissertation is 187 pages long. It is structured in an introduction, four chapters, a description of the contributions, prospects for future research and development, a list of the doctoral student's publications, and a bibliography (references).

Chapter I of the dissertation presents a classification, analysis of existing solutions, and directions for improving the development of interactive laboratories.

An analysis of the state of the problem has been carried out, and the goal and objectives of the dissertation have been defined.

Chapter II examines models, architectural and technological solutions for building an interactive laboratory for photovoltaic systems.

Chapter III, doctoral student Shotarova, has devoted to the design and implementation of a web-based interactive laboratory for photovoltaic systems.

Chapter IV "Development and Implementation of an Interactive Laboratory with Remote Access for Research of Photovoltaic Systems" presents the concept and design stages, overall architecture, software and network architecture, software implementation, validation results, and load testing.

All chapters end with conclusions.

5. Characterization and evaluation of the dissertation work and contributions

In the self-assessment of the contributions presented by the doctoral student, a total of 8 contributions are formulated, which are classified as scientific-applied (4 pieces) and applied (4 pieces).

I believe that the contributions presented faithfully reflect those received by a Ph.D. Eng. Snezha Shotarova results. With the presented work, the doctoral student demonstrates her knowledge and skills for in-depth research and solving scientific problems of a scientific-applied and applied nature.

In my opinion, the contributions are scientific and applied, being in the field of digitalization of engineering education and distance learning for students.

In my opinion, the contributions relate to adapting known methods and algorithms and creating new models and software in a dynamically developing field.

6. Assessment of the publications and personal contribution of the doctoral student

The results obtained during the development of the dissertation work have been presented in four publications. In all publications, the PhD student is the first author, one is with one co-author, one is independent, two are in Latin and one is referenced and indexed in a global database (Scopus).

I believe that the doctoral student's publications on her dissertation reflect the main contributions she claims.

7. Abstract

The submitted abstract is 32 pages long and complies with the requirements for its preparation. It correctly reflects the main results and contributions of the dissertation work.

8. Recommendations for future use of the dissertation contributions and results

I have the following recommendation and direction for future work:

- To improve publication activity in publications that are referenced and indexed in global databases (Scopus, WoS, etc.).

This recommendation does not refer to the essence of the contributions, therefore it does not affect my personal positive impression of the scientific production and other merits of the doctoral student.

CONCLUSION

After a thorough acquaintance with the dissertation work and publications of M.Eng. Snezha Ventsislavova Shotarova, I am convinced that the results achieved from the research were obtained entirely with her participation. With the presented work, the doctoral student demonstrates her capabilities for research and solving scientific problems of a scientifically applied and applied nature.

The dissertation contains scientific-applied and applied results that represent an original contribution to science and meet all the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the relevant Regulations of the Paisii Hilendarski University.

The dissertation shows that the doctoral student, M.Eng. Snezha Ventsislavova Shotarova, possesses in-depth theoretical knowledge and professional skills, demonstrating qualities and skills for independently conducting scientific research.

Based on the analysis made, I give a positive assessment of the developed dissertation work and consider it reasonable to propose that M.Eng. Snezha Ventsislavova Shotarova acquire the educational and scientific degree "doctor" in the scientific field 5. Technical Sciences, professional field 5.3. Communication and Computer Engineering doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)".

25.03.2026 year

Prepared the opinion:

(signature)

Assoc. Prof. Dr. Nikolay Shopov