

STATEMENT

by Assoc. Prof. Sevil Aptula Ahmed-Shieva, PhD, Technical University of Sofia, Plovdiv Branch

of a dissertation for the acquisition of an educational and scientific degree "**Doctor**"

Field of higher education: 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.)"

Author: Anatoliy Rosenov Parushev

Topic: Automation of a laboratory of eco-energy technologies

Supervisor: Prof. Rumen Kostadinov Popov, PhD – Plovdiv University "Paisii Hilendarski"

1. General presentation of the procedure and the PhD student

By Order No. PD-22-2023 of 22.10.2025 of the Rector of the Plovdiv University "Paisii Hilendarski" (Plovdiv), I am appointed as a member of the scientific jury for providing a procedure for defending a dissertation authored by M. Eng. Anatoliy Parushev according to the described procedure.

The author of the dissertation has completed his higher education at the University of Plovdiv and in 2020 he acquired a Bachelor's degree in Computer and Communication Systems, and in 2021 he received a Master's degree in Information Security. Immediately after that, he was enrolled in fulltime doctoral studies at the Department of Electronics, Communications and Information Technologies (ECIT) at the Faculty of Physics and Technology of the Plovdiv University "Paisii Hilendarski" with scientific supervisor Prof. Rumen Popov, PhD. Since the end of 2021 M. Eng. Parushev is assistant professor at the same department. His research interests are in the field of communication and computer technology, renewable energy sources, thermodynamics and heat transfer.

The presented by Eng. Parushev set of materials is in accordance with Art. 36. (1) of the Regulations for the Development of the Academic Staff of the University of Plovdiv and shall include the documents described therein.

2. Topicality

The dissertation of M. Eng. Anatoliy Parushev is dedicated to the study of modern eco-energy technologies in remote mode - a topical problem that is extremely multidisciplinary and requires knowledge in many areas of science. In this context, the goal set in the dissertation is relevant not only for the field of computer science.

3. Knowledge of the problem

The PhD student presented an overview of the most popular existing tools for automation of laboratories in the field of eco-energy technologies. An overview of existing virtual and real laboratories with remote access is made, with the main focus being on the analysis of their functionality and capabilities that they provide for scientific and educational purposes. Various aspects of their functioning are presented, including their interface, the quality of the experimental conditions provided, as well as the opportunities for integration into the educational process. Anatoliy Parushev has managed to systematize the advantages, disadvantages and features of both the

approaches to creating and the way of functioning of laboratories (real and virtual) with remote access. The challenges to the hardware and software requirements of these systems are outlined. This also led to the formulation of the aim and tasks of his dissertation.

4. Research methodology

The presented methodology can be described as the implementation of a challenging engineering assignment aimed at modernizing an existing laboratory heat transfer system. Therefore, the capabilities of the SR1162E laboratory equipment, the principles of its functioning are described in detail. Afterward, Steps for modernization have been proposed, incorporating both hardware and software solutions to enable remote operation of the laboratory equipment.

The purpose of the dissertation is *"Development, construction and experimental validation of an automated laboratory bench with remote control capabilities, intended for training and research of thermal processes. The system should be scalable, reliable and applicable in both educational and research environments."*, has been achieved by solving several main tasks: 1) Design and implementation of hardware architecture of a laboratory bench with the ability for remote control and real-time monitoring; 2) Development of a communication infrastructure based on industrial protocols (Modbus, TCP/IP) and modern IoT solutions; 3) Creating and configuring a software system for storing, visualizing, controlling and analyzing experimental data using an environment such as Node-RED. 4) Creation of a methodology for measuring and analyzing velocity, mass flow and thermodynamic parameters of air flow in a closed duct.

5. Characteristics and evaluation of the dissertation and contributions

This dissertation is motivated by the need to create a sustainable, scalable and functional laboratory system in the field of eco-energy technologies that meets the modern requirements for automation, digitalization and open access. The aim of the development is to apply a comprehensive engineering approach to the construction of such a system – from the selection and configuration of hardware components, through the development of management and measurement methodologies, to the integration of software solutions for monitoring and remote control.

The dissertation is well-structured, with lists of symbols and abbreviations at the beginning creating a positive impression. A total of 139 literature sources have been referenced. The core of the research work is presented in Chapters 2 and 3, where the author proposes a solution to the objectives and tasks defined in Chapter 1. As a result, a robust and scalable platform has been implemented—an automated test bench with remote access—emphasizing the hardware architecture, communication framework, and software integration of the individual system modules. Detailed block diagrams and schematic electrical circuits are provided, along with well-justified technical decisions and logical interconnections between hardware and software components. The experimental studies presented in Chapter 4 validate the functionality and applicability of the achieved modernization.

Anatoliy Parushev has distinguished two groups *of contributions* – three (3) scientific-applied and five (5) applied. I acknowledge the presence of contributions in the dissertation in terms of applying engineering approaches to the development of modern systems with remote access and control. The author has presented the complete configuration of the laboratory test bench after its automation, including all considered hardware components, as well as a methodology for conducting a set of remote laboratory exercises and experiments using the modernized bench.

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

The dissertation includes six (6) publications, all of which are conference papers. All publications are co-authored and written in English, with one indexed in Scopus. In three of them, the author is the first author. It is noteworthy that the publication activity of M. Eng. Parushev on the dissertation topic is limited to three scientific forums: 1) 2024 XXXIII International Scientific

Conference Electronics (ET), Sozopol, Bulgaria, 2024 (participation with 1 paper); 2) INTED 2023 17th annual International Technology Education and Development Conference Valencia (Spain) - 6th, 7th and 8th of March, 2023 (participation with 3 papers); 3) ICERI 2022 15th annual International Conference of Education, Research and Innovation (online) (participation with 2 papers).

The presented publications reflect the essence of the dissertation—the proposed approaches and obtained results. This provides sufficient grounds to conclude that the main results presented in the dissertation were achieved with the active participation of the doctoral candidate. As of the date of this review, there is no evidence of citations of the dissertation-related publications.

I recommend that the doctoral candidate strengthen their publication activity in scientific journals and other forums indexed in Scopus/WoS. It would also be beneficial to consider single-author publications.

7. Dissertation Abstract

The abstract provides a concise overview of a fully functional laboratory system that enables remote control, real-time parameter monitoring, and the execution of experiments with high accuracy and reliability. It outlines the steps taken to build the system and summarizes the contributions.

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

The developed dissertation addresses a relevant problem and proposes up-to-date solutions. The stated aim has been achieved. *Remarks and recommendations:* Some repetitions and unnecessary descriptions of well-known approaches are noticeable. Certain technical specifications of the components used for modernization could be provided in an appendix. Including a “before-and-after” photo in a figure would make it easier to evaluate the improvement.

The remarks and recommendations do not diminish the significance of the proposed solutions and achieved results, nor do they affect the overall positive impression of the dissertation

CONCLUSION

The dissertation of M. Eng. Anatoliy Parushev treats a topical problem and represents a completed research development with scientific-applied and applied contributions. In conclusion, the presented dissertation contains original results and approaches.

The PhD student fulfils the national minimum requirements for the acquisition of the degree of Doctor in accordance with the Law on the Development of Academic Staff in the Republic of Bulgaria, Rules for Application of Law on the Development of Academic Staff in the Republic of Bulgaria and the relevant Regulations of the Plovdiv University "Paisii Hilendarski".

In view of the above, I confidently give my positive assessment and propose to the honorable scientific jury to award the educational and scientific degree of "Doctor" to M. Eng. Anatoliy Rosenov Parushev in the field of higher education 5. Technical Sciences, professional field 5.3. Communication and Computer Engineering, PhD program "Automation of Areas of the Intangible Sphere (Medicine, Education, Science, Administrative Activity, etc.)".

Drafted the opinion:

17.11.2025 г.

(Assoc. Prof. Sevil Ahmed-Shieva. PhD)