

STATEMENT

by Prof. Dr. Nayden Nedkov Chivarov

on the dissertation thesis of Eng. Radoy Strezimirov Dukovski

entitled: "Decision Making in the Management of Technological Objects",

submitted for the award of the educational and scientific degree "Doctor"

The dissertation thesis of Eng. Radoy Strezimirov Dukovski, submitted for the award of the educational and scientific degree "Doctor" in scientific field 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation, doctoral program "Automated Information Processing and Control Systems", entitled "Decision Making in the Management of Technological Objects", was presented at a meeting of the "Intelligent Systems" section of IICT-BAS on 15.12.2025, at which a decision was taken to direct the dissertation to public defense.

By Order No. 340/22.12.2025 of the Director of the Institute of Information and Communication Technologies – BAS, I was appointed as a member of the Scientific Jury for the defense of this dissertation thesis.

As a member of the Scientific Jury, I received the dissertation thesis, the abstract, and all required administrative documents related to the procedure. At the first meeting of the Scientific Jury held on 23.12.2025, I was elected to prepare an official opinion.

In preparing this opinion on the dissertation thesis, I have complied with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and its Implementing Regulations.

The requirements under Article 3 of the Regulations on the specific conditions for acquiring scientific degrees and holding academic positions at IICT-BAS have been

fulfilled with regard to the minimum number of points for professional field 5.2. Electrical Engineering, Electronics and Automation for the award of the educational and scientific degree “Doctor”. Under indicator group A, the doctoral candidate has the required 50 points, and under indicator group G the required number is 30 points, while the candidate has accumulated a total of 113.33 points.

The presented dissertation thesis entitled “Decision Making in the Management of Technological Objects” comprises 193 pages, including 141 figures, 10 tables, and a bibliography of 146 references. The text is structured into an introduction, four chapters, conclusions and a summary of the obtained results, a list of publications related to the dissertation, a declaration of originality of the results, and a bibliography.

According to the similarity report, the value of Similarity Coefficient 1 (SC1) is 2.18% and that of Similarity Coefficient 2 (SC2) is 0.52%, which gives me sufficient grounds to conclude that the dissertation is an original scientific study and does not contain elements of plagiarism.

The aim of the dissertation thesis is “to develop, using modern design and automatic control systems, models of real technological objects to support the decision-making process in their management.”

To achieve this aim, eight research tasks were formulated:

1. To conduct an in-depth theoretical analysis of decision-making systems and the challenges arising in their application, presented using modern theoretical approaches.
2. To analyze the operation of a thermal-energy technological control object—a steam generator—by developing decision-making system models for control at the steam-water mixture level and at the drum level.
3. To propose a decision-making system for automatic regulation of the steam-water mixture level in the drum during real-time operation of an industrial steam generator.
4. To design a membrane bioreactor for the production of yeast *Hansenula polymorpha*, determining the required aeration rate to achieve a minimum material deformation rate in the membrane boundary layer of 0.8 s^{-1} , as well as the required stirring rate to achieve a desired maximum deformation rate in the cell growth chamber of 15 s^{-1} .
5. To analyze the operation of a chemical-technological control object—a trickle filter—by performing simulation modeling of decision-making systems for its control.
6. To propose a decision-making system for real-time operation of an industrial trickle filter.

7. To analyze the operation of a chemical-technological control object—a two-layer heater—by performing simulation modeling of decision-making systems for its control.
8. To propose a decision-making system for real-time operation of an industrial two-layer heater.

I accept the formulated contributions of the dissertation thesis and consider that they enrich the existing scientific field with new knowledge. A particularly positive impression is made by the fact that the control objects are real industrial facilities from the Karachaganak Petroleum Operating B.V. (KPO) refinery in Kazakhstan and the El Paso refinery in the USA.

There are five publications related to the dissertation thesis. Four of them are single-author publications: three published in the scientific journal "Engineering Sciences" and one included in the proceedings of the international conference "9th IEEE International Conference on Big Data, Knowledge and Control Systems Engineering". One publication is co-authored and published in a scientific journal with IF/SJR – Bulgarian Chemical Communications Journal. All publications are peer-reviewed and indexed in internationally recognized scientific databases, thereby meeting the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria.

I have the following remark: the doctoral candidate should focus efforts on increasing publication activity in renowned international journals.

After reviewing the presented dissertation thesis, the related publications, and their scientific contributions, I conclude that the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria and its Implementing Regulations, as well as the Regulations on the specific conditions for acquiring scientific degrees and holding academic positions at the Institute of Information and Communication Technologies – BAS, have been fully met. Expressing my positive assessment of the submitted materials, I recommend that the esteemed Scientific Jury award the educational and scientific degree "Doctor" to Eng. Radoy Strezimirov Dukovski in professional field 5.2. Electrical Engineering, Electronics and Automation, doctoral program "Automated Information Processing and Control Systems".

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3314