REVIEW

regarding the competition for the academic position of "Associate Professor" in the professional field 5.2. Electrical Engineering, Electronics and Automation, specialty "Application of the principles of cybernetics in various fields of science" for the needs of the Section "Cyber-Physical Systems" at the Institute of Information and Communication Technologies (IICT-BAS)

Reviewer: Prof. Velislava Noreva Lyubenova, DSc, Institute of Robotics-BAS

1. Brief biographical data

By order Order No. 35/12.02.2025 of the Director of IICT-BAS, I am included in the Scientific Jury for the above-mentioned competition, announced in the State Gazette, issue 105 of 13.12.2024. The only candidate is Ch. As. PhD Stanislav Dimitrov Dimitrov from the Department "Distributed Information and Control Systems" at IICT-BAS.

Dr. Dimitrov is an engineer, a bachelor's degree in 2008 in "Automation and Information Technologies" at the Chemical Technology and Metallurgical University (CTMU) - Sofia, and since 2010 - a master's degree in "Information Technologies" at the same University. He obtained the scientific and educational degree (SED) "Doctor" at IICT-BAS in 2017 in professional field 5.2 with the topic of his dissertation "Application of the laws of control theory in software systems".

The research activities of Chief Assistant Dr. Dimitrov took place almost entirely at the Institute of Information and Communication Technologies, where he worked as a programmer from 2009-2019, and since 2019 he is Ch. Assistent.

2. General description of the materials presented

The provided copies of the competition documents contain:

- ✓ autobiograaphy on the European model;
- ✓ a copy of a diploma for the educational and scientific degree "Doctor";
- ✓ certificate of internship in the specialty;
- ✓ a list of scientific publications for participation in the competition, which do not repeat those submitted for the acquisition of the educational and scientific degree "Doctor";
- ✓ a list of citations;
- ✓ summaries of the scientific publications for participation in the competition - in Bulgarian and English;
- ✓ copies of scientific publications for participation in the competition;
- ✓ reference of fulfillment of the minimum requirements of the IICT;
- ✓ reference of original scientific and applied scientific contributions;
- ✓ list of publications included in the dissertation;
- ✓ a declaration that there is no plagiarism proven according to the law.

Regarding to the necessary documents for participation in the competition and their content, according to the regulatory framework of the Law on the Development of the Academic Staff of the Republic of Bulgaria (LDASRB), The Regulations for its implementation, the Regulations on the conditions and procedure for acquiring scientific degrees and for occupying academic positions at the Bulgarian Academy of Sciences and the Regulations on the specific conditions for acquiring scientific degrees and for holding academic positions at IICT-BAS, I have no objections.

3. Fulfillment of minimum requirements

Chief Assistant Dr. Stanislav Dimitrov has submitted 31 scientific publications for his participation in the competition. Ten publications are in publications that are referenced and indexed in world-renowned databases and are thematically united and systematized in equivalent monographic works.

The remaining works are 21 in number, of which 9 publications are included in group G7, referenced and indexed in the world evaluation system (WoS or Scopus). 12 publications are included in group G8.

The review of the publications showed that in group B4, one of the publications had 30 points instead of the recorded 20. Thus, 300 points are reported for indicator B, instead of the recorded 290.

The points from group Г are 235. The candidate has scored 120 points from the citations under indicator D, but as can be seen from the list of citations, a large part of them are not entered and do not necessarily have to be counted in the minimum requirements.

Under indicator E, the candidate receives 50 points related to Dr. Dimitrov's participation in 5 national scientific projects, verified through links to the project pages.

The candidate meets and exceeds, in most indicators, the minimum national requirements for the academic position "Associate Professor" of both the LDASRB and the IICT-BAS (Table 1)

Table 1

Group	Content	Min points LDASRB	Min points IICT	Evidence material	Points Ch. As. d-r Dimitrov
A	Indicator 1	50	50	Dissertation "Application of the Laws of Control Theory in Software Systems"	**50**
B	Indicator 4 Habilitation thesis – scientific publications that are referenced and indexed in world-renowned databases	100	100	Equivalent to a monograph, thematically united and systematized scientific works - publications (Reference for minimum requirements of IICT - publications with numbers 1-10 in the list of publications from group B4)	**300**
Г	Sum of indicators 5 to 9	200	220	(Information on minimum requirements of IICT -	**235**
Д	Sum of indicators 12 to 15	50	60	(Information on minimum requirements of IICT - citations)	**120**
E	Sum of indicators 15 to to the end	-	20	(Information on minimum requirements of IICT - Participation in a national scientific or educational project)	**50**

4. General characteristics of the candidate's scientific and applied scientific activities

Of the 31 publications presented, 19 are indexed in WoS and/or Scopus, and 12 articles are published in journals and conference proceedings (non-indexed). Of the 19 indexed publications, 2 are into the quartile Q1 ([B4.9] и [Г7.3]), 1 in Q2 ([B4.2]), 2 in Q3 ([Г7.8], [Г7.9]), one in Q4 ([B4.10]), 3 are with SJR ([B4.6, B4.8, Г7.7]). Four of the indexed works have been published in journals, and 15 – as articles in conference proceedings.

Four of the publications have 1 author (the candidate) ([B4.5, B4.6], [G7.5] and [G8.6]), 6 - with two co-authors, 12 are with three co-authors, 9 - with four co-authors. In 11 publications, the candidate is the first author ([B4.4, B4.7], [Г7.1, Г7.2, Г7.5] и [Г8.1, Г8.2, Г8.4, Г8.7, Г8.8, Г8.11]).

The publications cover the period 2015-2024. All of them are after the defense of a dissertation for the SED "doctor".

Ch. As. PhD Dimitrov has participated in four contracts funded by the National Science Foundation in the period 2016-present, related to Modeling and Optimization of Urban Traffic in a Network of Intersections, Integration of Bi-Hierarchical Optimization in an Information Service for Portfolio Optimization, Data analysis on the integration of ICT resources in Bulgarian schools, as well as with Research on formal models for optimization and personalization of modern technological methods of STEM education (SHAPES), which is active project. The candidate has participated in the National Scientific Program "Intelligent Animal Husbandry".

The topics of these contracts are naturally and logically related to Dr. Dimitrov's scientific interests, as well as to the results in the publications submitted for the competition. They are in the areas of modeling, optimization and management of transport traffic, financial management of economy objects, applications of modern information and communication technologies (ICT) for analysis and offering effective solutions regarding financial indicators of economy objects, analysis and development of innovative training approaches.

The 10 publications presented as equivalent to a monographic work have been united by the candidate thematically as "Modeling and defining optimization tasks for management". Six of them are related to optimization tasks for transport traffic management ([B4.1-B4.6]), the remaining four ([B4.7-B4.10]), as well as publications (D7.1, B8.1-B8.3] - with economy objects management. Nine publications are thematically related to quantitative analysis, resource redistribution and application of modern ICT solutions for economy objects [Г7.2-Г7.5, Г8.4-Г8.8]. Eight publications relate to Analysis and Evaluation of Innovative Training Approaches [Г7.6-Г7.9, Г8.9-Г8,12].

5. Contributions

The candidate has presented an extensive and detailed statement of contributions, which I would summarize as follows:

I. Approaches and models for optimal transport traffic management

Application of the two-hierarchical approach and other approaches for the purpose of optimizing the management of a road network controlled by traffic lights ([B4.1- B4.6]).

The two-hierarchical approach makes it possible to expand the dimensionality of the controlled variables in optimization models, obtaining optimal values of two management objectives (minimum queue length and maximum traffic flow intensity) by means of two control variables (traffic light cycle duration and traffic light green signal duration). The approach has been

applied to traffic management in a network of varying numbers of intersections in various European cities, and a comparison with other methods has been made.
A single-objective optimization model has been developed to control the cycle length of traffic lights and the phase length of light signals using the Excel GRG Nonlinear Multistart optimization module in order to improve the level of service (LOS) performance indicator. An algorithm has been developed to find the optimal allocation of limited resources in public transport.

II. Approaches and models for resource optimization in economy objects

Approaches and models for analysis and optimization of resources, raw materials and storage spaces in economy objects have been developed ([B4.7- B4.10], [Г7.1, Г8.1, Г8.2, Г8.3)

Based on mathematical data analysis, approaches have been proposed to identify weaknesses in economy object management with the aim of improving it, optimizing costs, and increasing productivity and profit.

The proposed models improve the organization of warehouse spaces, optimize the composition of food mixtures with minimal costs, maximize profit through optimal age distribution of animals, support the decision-making process, related to the costs of purchasing and storing raw materials (fuel).

III. Application of modern ICT solutions to improve financial performance in in economy objects ([Г7.2- Г7.4, Г8.4-Г8.8])

Through mathematical analyses of financial indicators in economy objects and risk assessment, are proposed:

- ✓ Intelligent approach to minimizing risk and optimizing management to achieve maximum return.
- ✓ An information system' module that forecasts the demand for finished products in order to optimize production processes and manage inventory.
- ✓ A model from the portfolio optimization' class for minimizing economic risk
- ✓ An approach to automated weighing and counting of animals on farms and other solutions to improve financial performance in economy objects.

IV. Analysis and evaluation of innovative training approaches ([Г7.6-Г7.9, Г8.9-Г8.12])

A concept for optimizing a modern technology-based approach in teaching and integrating innovative teaching methods has been developed. A conceptual model of the modern process of teaching STEM subjects in a technological environment has been presented.

Based on a developed concept for conducting a study of the dynamics of the attitude of participants in the educational process towards new technologies offered in education and on the basis of many years of research, trends in the application of ICT devices, electronic resources and educational games in the educational process have been identified. Their usefulness and effectiveness are analyzed, as well as the main obstacles to their wider use. The application of electronic educational resources and technologies in different groups of subjects has been analyzed and the trends that are observed have been outlined.

6. Critical notes and recommendations

My critical remarks are related to the overly detailed report on contributions presented, which should be more summarized.

Technical notes: in the list of publications of two of them (B4.9 and B4.10) the impact factor (B4.9 - IF (2023) 2.3), the impact rank (B4.10 - IR (2023) 0.18), as well as their quartile (B4.9 - Q1, B4.10 - Q4) are not noted. There should be a link to the databases (Scopus/WoS) for each

indexed publication. There is no official note or link to a web page available, certifying the candidate's participation in one of the projects, Contract No. KP-06-N75/11, which is current.

These omissions do not affect my opinion of the research and results presented in the publications. I highly appreciate their contribution and emphasis on topics important to society and the economy.

7. Significance of contributions to science and practice

In my opinion, the candidate's contribution are significant to science and practice.

Chief Assistant Dr. Dimitrov works on topical and socially significant topics as the proposed approaches, methods and models undoubtedly enrich science and practice in the areas in which the candidate works and increase the efficiency of the objects to which they are applied. The developments related to the analysis and evaluation of innovative training approaches are also relevant, and the results obtained are useful and a basis for future research.

The team with which the candidate works includes erudite and established scientists in the fields of research, which is a very good prerequisite both for obtaining quality results and for improving the qualifications of younger scientists.

CONCLUSION

The candidate for the announced competition, Chief Assistant Professor Dr. Stanislav Dimitrov, fully satisfies the conditions, criteria and requirements for the election to the academic position of "Associate Professor" according to the Law on the Development of the Academic Staff of the Republic of Bulgaria, the Regulations for the Implementation of the Law on the Development of the Academic Staff of the Republic of Bulgaria, The Regulations on the conditions and procedure for acquiring scientific degrees and occupying academic positions at the Bulgarian Academy of Sciences and the Regulations on the specific conditions for acquiring scientific degrees and occupying academic positions at the Institute of IICT-BAS . Considering the above and the overall scientific and applied scientific activity of the candidate, **I give my positive vote** and **convinced recommend to the esteemed members of the Scientific Jury** to vote positively for the selection of the candidate, as well as to propose to the Scientific Council at the Institute of Information and Communication Technologies – BAS, **to choice Chief Assistant Dr. Stanislav Dimitrov Dimitrov for the academic position of "Associate Professor"** in field 5.2. Electrical Engineering, Electronics and Automation, scientific specialty "Application of the Principles of Cybernetics in Various Fields of Science" for the needs of the section "Cyber-Physical Systems" of IICT-BAS.

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Sofia Reviewer: Prof. Veli