

REVIEW

For a competition for the academic position "Associate Professor" SN 10/27.01. 2026 .
With candidate: **Chief. assistant. PhD Yordanka Liubomirova Boneva**

From Prof. DSc Krasimira Stoilova – Institute of Information and Communication Technologies (IICT) – Bulgarian Academy of Sciences (BAS)

By order № 74 from 27.03.2026 г. of the Director of IICT - BAS, issued on the basis of a decision of the Scientific Council of IICT, protocol №3 from 25.03.2026 I have been appointed as a member of the scientific jury for a competition to occupy the academic position of "Associate Professor" in the field of higher education 5. Technical Sciences; professional direction 5.2 „Electrical engineering, electronics and automation”, scientific specialty „Automated information processing and management systems” for the needs of a section „Distributed and information control systems” of IICT - BAS. Only one candidate submitted documents for the announced competition - Assistant. Prof. PhD Yordanka Liubomirova Boneva.

1. Brief biographical data

Yordanka Boneva is a bachelor with a degree in "Computer Systems and Technologies" at TU-Sofia, Faculty of German Engineering Education and Industrial Management. She has a master's degree in "Information Technologies in Media Business" - University of Library Science and Information Technologies. Since 2013, she has been a programmer at IICT-BAS, and since 2017, she has been a doctoral student. Chief Asst. Prof. Dr. Y. Boneva has been a "doctor" since 26.03.2021, and since 2021 she has been a chief assistant professor at IICT.

2. General description of the presented materials

Senior Assistant Professor Dr. Y. Boneva has submitted all necessary materials for participation in the competition in accordance with Art. 10(1) of the Regulations on the Specific Conditions for Acquiring Scientific Degrees and for Holding Academic Positions at IICT-BAS.

An official note was presented regarding the total work experience at IICT-BAS, which is 15 years, of which she worked as a chief assistant for 4 years.

3. General characteristics of the scientific and scientific-applied activity

The candidate participates in the competition with 27 scientific publications that are different from the publications in the dissertation. Of the submitted publications, 3 have an impact factor (IF) (B4.4, B4.7, B4.8) with the sum of the IF being 7.4; out of them, 8 have an SJR (B4.1, B4.6, B4.9, B4.10, Г7.2, Г7.3, Г7.5, Г7.6); out of them, 7 are indexed in Scopus and WoS (B4.2, B4.3, B4.5, B4.11, Г7.1, Г7.4, Г7.7) and 9 are indexed in other databases (NACID, ERIH PLUS, CEOOL) - (Г8.1 - Г8.9). One publication is with Q1 [B4.7], two publications are with Q2 [B4.4, B4.8], two publications are with Q3 [B4.6, Г7.5] and one publication is with Q4 [B4.9]). All 27 publications are included in NACID. Eight of the publications are independent (B4.1, B4.2, B4.10, Г7.1, Г8.1, Г8.3, Г8.8, Г8.9); in 4 of the publications Y. Boneva is in first place among the authors (B4.6, B4.9, Г8.4, Г8.6), in 7

publications she is in second place (B4.3, B4.4, B4.7, B4.11, Г7.4, Г7.7, Г8.2), in 6 - in third place (B4.5, B4.8, Г7.2, Г7.6, Г8.5, Г8.7) and in 2 in fourth place (Г7.3, Г7.5).

The scientific interests of Chief Asst. Prof. Y. Boneva, according to the publications for the competition, are related to urban traffic management, application of information and communication technologies in education, innovative information and communication approaches in STEM education, and modern management methods in agricultural sites.

The habilitation thesis contains thematically related scientific publications on management, optimization, analysis and simulations of transport traffic in an urban environment, aiming to increase the throughput of intersections and reduce vehicle congestion (for brevity I will use the term "cars") at traffic lights. An intelligent urban traffic management system has been developed using fuzzy logic, simulations in the Aimsun environment and analysis of the results for different urban architectures. The research in this area includes publications [B4.1; B4.2, B4.3, B4.4, B4.5, B4.6, B4.7, B4.8, B4.9, B4.10, B4.11, Г7.1, Г7.2, Г8.1, Г8.2, Г8.3].

The second direction in the candidate's research interests relates to the development of modern methods with the application of information and communication technologies (ICT) in the educational process. Here, the research is in two directions. One is the design of educational games reflecting various aspects of this process, presented in publications [Г7.3, Г7.4, Г7.5, Г7.6, Г8.4, Г8.5, Г8.6, Г8.7, Г8.8]. The second research direction is the synthesis of ICT approaches in STEM education [Г7.5, Г7.6, Г8.9].

I am not aware of any data on the presence of plagiarism in the presented works.

4. Analysis of scientific and applied scientific achievements according to the materials

I think that the candidate has very well integrated the results of her scientific research, which I fully support.

SCIENTIFIC CONTRIBUTIONS

I evaluate the main scientific results in the synthesis of optimal urban traffic management.

1. Optimal urban traffic management in a network of intersections has been synthesized by defining and solving a hierarchical optimization problem. As a result, the throughput of the intersection has been increased and the queues of cars at traffic lights have been reduced [B4.1, B4.2].
2. A model for urban traffic management has been synthesized, which reflects the stochastic nature of real processes in the transport system. The formalization of the control is with a linear-quadratic Gaussian problem. The effectiveness of the model has been proven by comparison with the current state. The model has been evaluated in the AIMSUN programming environment [Г7.2].
3. An intelligent urban traffic management system is synthesized by applying a fuzzy control method to reflect the random nature of traffic. Fuzzy control controllers are synthesized and applied to urban intersections with different architectures. It is proven that the synthesized models realize better throughput of intersections by reducing traffic light queues compared to deterministic control [B4.4, B4.5, B4.7, B4.8].

SCIENTIFIC APPLIED AND APPLIED CONTRIBUTIONS

1. Urban traffic management models with heuristic fuzzy controllers have been synthesized. Simulations have been performed in the specialized AIMSUN software environment for different intersection configurations. The advantage of fuzzy control over conventional control has been proven for all models. Better throughput of intersections has been achieved [B4.3, B4.9].

2. An assessment of a real existing T-junction, which is planned to be replaced with a roundabout, has been made using AIMSUN traffic modeling. The simulation results show the preservation of the existing intersection architecture, which I consider to be a significant contribution to urban traffic planning [B4.10, Γ8.1].
3. Using AIMSUN traffic modeling, an assessment of traffic at a real intersection was made, compared with traffic light settings management using three optimization approaches [B4.11]. A comparison of the results obtained by different criteria is presented in tabular and graphical form.
4. The main factors for successful implementation of so-called serious games for learning are analyzed. The level of their technological and computer competence for their inclusion in learning is studied [Γ7.3, Γ7.5, Γ8.5].
5. A methodology for developing educational game software is synthesized, taking into account age, game content, background story, and the selection of an appropriate genre. A platform, technological tools, and programming languages are selected for game development and implementation. A game prototype is created and a way to personalize it for students is described. As a result of the research, it has been established that combining game elements in the learning process leads to an increase in the average success rate of students, which is a prerequisite for improving the quality of education at school. [Γ7.4].
6. The degree of ICT integration in Bulgarian schools was studied in order to outline guidelines for the effective implementation of innovative technological tools in the field of Science, Technology, Engineering and Mathematics (STEM) in secondary education [Γ7.6, Γ8.4, Γ8.6, Γ8.7, Γ8.8, Γ8.9].

I positively assess the candidate's scientific and applied scientific contributions in the research areas presented.

5. Citations

The observed citations of 10 publications submitted for participation in the competition are 15, with the citing publications being mainly in publications indexed and referenced in Scopus and/or Web of Science.

6. Fulfillment of minimum requirements and other activities

Chief Assistant Professor Y. Boneva fulfills and exceeds in all indicators the minimum requirements for the academic position of "associate professor" of the Regulations on the specific conditions for acquiring scientific degrees and for occupying academic positions at IICT-BAS. Requirements/performance for individual indicators is as follows: indicator A - 50/50; B - 100/350; Γ - 220/225; D - 60/168; E - 20/50. The total number of points is 843 with a required minimum of 450.

Chief Asst. Dr. Y. Boneva has active research and applied science activities. Chief Asst. Y. Boneva is a participant in 5 projects (according to the attached list in the List of Minimum Points): NNP Intelligent Animal Husbandry, 2021-2024 and 4 projects with the National Science Foundation. In addition to what is stated in the documents, Y. Boneva is currently the head of a won project with the National Science Foundation for young scientists (since December 2025) and is participating in another project with the National Science Foundation, presented in her CV. Thus, according to indicator E, she has not 50, but 80 points, including both current projects, one of which she is a scientific supervisor.

Attached is a certificate for invited editor of a specialized edition of the journal Mathematics, MDPI on the topic "Intelligent and Fuzzy Systems: Applications in Engineering and Technology" from December 2023.

Attached is a certificate for invited editor of a specialized edition of the journal Future Internet, MDPI on the topic "Intelligent Computational Methods for Urban Traffic Management and Control" from February 2026.

Attached is a certificate for successfully completing the 'Problem Solving & Decision Making' training course under the Erasmus program from Shipcon in Palermo, 10.07.2023 - 14.07.2023.

Attached is a certificate for successfully completing the "Aimsun Next: Core Skills" training course organized by Aimsun, London, 22.06.2020 - 26.06.2020.

Certificates of proficiency in English and German are also attached.

Chief Assistant. Dr. Yordanka Boneva has active research and applied science activities, characterizing her as a highly qualified scientist with international prestige.

7. Critical notes and recommendations

I have no objections to the candidate. My recommendation is that she deepen her research on traffic management and I wish to achieve new scientific results in this area and publish in prestigious journals with an impact factor and impact rank.

8. Personal impressions of the candidate's work

I have been familiar with Y. Boneva's activities since her entry into the Bulgarian Academy of Sciences, the development and defense of her dissertation, and her further scientific work. She has a desire and ambition for research work and over time has accumulated knowledge and skills for preparing professional papers. She has dedicated time and effort to studying the Aimsun traffic modeling system and most of her scientific results, published in prestigious journals, are models and simulations of urban traffic management systems in the Aimsun programming environment. I have excellent impressions of her willingness to get involved in the projects being developed and to find original solutions to the tasks set.

I highly appreciate the well-structured presentation of the competition documents with detailed information and active hyperlinks in the attached lists of publications and citations (all current).

9. **Conclusion.** Based on the submitted materials, the scientific and scientific-applied contributions, as well as the comprehensive assessment of the other indicators of the competition, **I give a positive assessment and recommend that the Honorable Jury propose to the Scientific Council of ICT-BAS to elect Chief Assistant Prof. Dr. Yordanka Boneva for the academic position of "Associate Professor", professional field 5.2 "Electrical engineering, electronics and automation", specialty "Automated information processing and management systems" for the needs of the "Distributed and information control systems" department at ICT-BAS.**

27.04.2026

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