

## REVIEW

regarding a competition for the academic position of “Associate Professor” in Professional Field 5.2. Electrical Engineering, Electronics and Automation, scientific specialty “Automated Systems for Information Processing and Control”, for the needs of the “Distributed Information and Control Systems” Section at the Institute of Information and Communication Technologies – BAS (IICT–BAS)

**Candidate: Dr. Yordanka Lyubomirova Boneva, Chief Assistant Professor**

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

### 1. Brief biographical data

By Order No. 74/27.03.2026 of the Director of IICT–BAS, I was appointed as a member of the Scientific Jury for the above-mentioned competition, announced in the State Gazette, No. 10 of 27.01.2026. The only candidate in the competition is Dr. Yordanka Lyubomirova Boneva, Chief Assistant Professor, from the “Distributed Information and Control Systems” Section at IICT–BAS.

Dr. Boneva holds a Bachelor’s degree in Computer Systems and Technologies from the Faculty of German Engineering Education and Industrial Management at the Technical University of Sofia, obtained in 2009, and a Master’s degree in Information Technologies in Media Business from the University of Library Studies and Information Technologies, obtained in 2016.

She acquired the educational and scientific degree “Doctor” at IICT–BAS in 2020 in Professional Field 5.2 with a dissertation entitled “Traffic Optimization in Urban Environment”.

The research activity of Dr. Boneva has been associated with IICT–BAS since 2017, where she was a doctoral student; in 2021 she worked as a software applications programmer, and since 2021 she has held the position of Chief Assistant Professor.

### 2. General description of the submitted materials

The copies of the competition documents provided to me include:

- application for participation in the competition for the academic position of “Associate Professor”;
- curriculum vitae in European format;
- copy of the diploma for the educational and scientific degree “Doctor”;
- certificate of professional experience in the specialty;
- list of scientific publications submitted for participation in the competition, which do not duplicate those submitted for the acquisition of the educational and scientific degree “Doctor”;
- list of citations;
- abstracts of the scientific publications submitted for participation in the competition – in Bulgarian and English;
- copies of the scientific publications submitted for participation in the competition;
- reference report on fulfilment of the minimum requirements of IICT;
- reference report on fulfilment of the minimum requirements of NACID;
- reference report on the original scientific and applied scientific contributions;
- list of the publications included in the dissertation thesis;
- declaration that no plagiarism has been established by the legally prescribed procedure in the scientific works;

- certificates for proficiency in English and German, for guest editorship of two special issues of the journals Mathematics and Future Internet (MDPI), and for completed courses, including in relation to mobility under the Erasmus+ programme.

With regard to the required documents for participation in the competition and their content, according to the regulatory framework of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules for its Implementation, the Regulations on the Terms and Procedure for Acquiring Scientific Degrees and Holding Academic Positions at BAS, and the Regulations on the Specific Conditions for Acquiring Scientific Degrees and Holding Academic Positions at IICT–BAS, concerning the terms and procedure for holding the academic position of “Associate Professor”, I have no objections.

**Table 1**

<b>Group</b>	<b>Content</b>	<b>Minimum points for Associate Professor under ADASRB</b>	<b>Minimum points for Associate Professor under IICT requirements</b>	<b>Supporting evidence</b>	<b>Points of Dr Boneva</b>
A	Indicator 1	50	50	Dissertation thesis “Optimization of Traffic in an Urban Environment”	<b>50</b>
B	Indicator 4. Habilitation thesis – scientific publications in journals/proceedings that are refereed and indexed in internationally recognized databases	100	100	Thematically grouped and systematized scientific publications equivalent to a monograph — publications listed as Nos. 1–11 in the list of publications under group B4, according to the IICT minimum requirements statement	<b>350</b>
Г	Sum of indicators 5 to 11	200	220	IICT minimum requirements statement — sum of indicators 5 to 11	<b>225</b>
Д	Sum of indicators 12 to 15	50	60	IICT minimum requirements statement — citations	<b>168</b>
E	Sum of indicators 16 onwards	—	20	IICT minimum requirements statement — participation in a national scientific or educational project	<b>50</b>

### **3. Fulfilment of the minimum requirements**

Dr. Boneva has submitted 27 scientific publications for participation in the competition. Eleven of the publications, refereed and indexed in internationally recognized databases, are thematically

unified and systematized as equivalent to a monographic work. Of the remaining 16 publications, 7 works included in Group  $\Gamma 7$  are refereed and indexed in the internationally recognized databases (WoS or Scopus). The remaining 9 publications are included in Group  $\Gamma 8$ .

The review of the submitted materials shows that 350 points are reported under indicator group B, 225 points under indicator group  $\Gamma$ , 168 points under indicator group  $\mathbb{D}$ , of which 150 points are from citations in publications indexed in WoS or Scopus, and 50 points under indicator group E, related to participation in national scientific projects. Under indicator group A, the candidate fulfils the requirement through the acquired educational and scientific degree “Doctor”. Therefore, Dr. Boneva fulfils and exceeds the minimum national requirements for holding the academic position of “Associate Professor” both under ADASRB and under the internal criteria of IICT–BAS. (Table 1)

#### **4. General characterization of the scientific and applied scientific publication activity of the candidate**

Of the submitted publications, 11 have SJR and are indexed in SCOPUS and/or WoS, and 3 of them also have an IF [B4.4, B4.7, B4.8]. Among them, one publication is in Q1 [B4.7], two are in Q2 [B4.4, B4.8], two are in Q3 [B4.6,  $\Gamma 7.5$ ], and one is in Q4 [B4.9]. The remaining publications are distributed as follows: 7 are indexed in SCOPUS and/or WoS without SJR and IF [B4.2, B4.3, B4.5, B4.11,  $\Gamma 7.1$ ,  $\Gamma 7.4$ ,  $\Gamma 7.7$ ], and 9 are non-indexed or indexed in other databases [ $\Gamma 8.1$ – $\Gamma 8.9$ ].

The publication activity of Dr. Boneva is characterized by international visibility, thematic consistency and a clearly expressed applied orientation. The submitted publications cover the period 2018–2024 and have not been used for the acquisition of the educational and scientific degree “Doctor”. Thematically, they present scientific and applied scientific results mainly in the areas of urban traffic management, the application of information and communication technologies (ICT) in education, innovative approaches in STEM education, and modern management methods in agricultural facilities. This outlines an interdisciplinary scientific profile in which the leading place is occupied by the area related to modelling, analysis and optimization of transport systems in an urban environment.

The habilitation work unites mutually related publications aimed at improving intersection capacity and reducing congestion through modelling and simulation of different management strategies in the Aimsun environment. In addition, the remaining publications broaden the candidate’s profile with results in the field of educational technologies, STEM education and the application of knowledge extraction methods. The studies are naturally connected with the topics of the projects in which the candidate has participated.

From a substantive point of view, the publications demonstrate a gradual expansion of the candidate’s research profile — from modelling and optimization of urban transport systems to applications of information technologies in education and the management of complex objects. Despite the interdisciplinary character of the works, the main scientific line remains related to the use of models, simulation environments and algorithmic approaches for analysis, management and decision support.

#### **5. Contributions**

Dr. Boneva has presented an extensive and detailed reference report on the contributions, which I would summarize as follows:

##### **Scientific contributions**

1. Models and approaches for the management of urban transport networks have been developed, formalized and verified, including fuzzy control of traffic lights, optimization schemes based on the

store-and-forward model, and hierarchical two-level optimization. The obtained results show possibilities for improving key transport indicators under different network configurations and load regimes. [B4.1; B4.2; B4.4; B4.6; B4.7; B4.8]

2. A stochastic model for urban transport network control has been synthesized, formulated as a linear-quadratic Gaussian problem. This approach extends the deterministic description of the transport process by accounting for random effects and inaccuracies in measurement information. [Г7.2]

3. A heuristic fuzzy approach for deriving rules for traffic intersection control has been developed, based on expert knowledge and tested under different levels of load. The obtained results show the applicability of fuzzy controllers for managing traffic flows in an urban environment. [B4.3; B4.5]

4. In the publications related to educational technologies and STEM education, methodological and conceptual solutions have been proposed for the use of ICT, educational games and innovative approaches in teaching, with an emphasis on digitalization and improving the effectiveness of the educational process. [Г7.3; Г7.4; Г7.5; Г7.6; Г8.4–Г8.9]

### **Applied scientific contributions**

1. Microsimulation models have been implemented in the AIMSUN environment for the analysis and evaluation of different strategies for urban transport network management. Through them, the practical applicability of the proposed models and controllers has been confirmed for configurations of one, two and four intersections. [B4.1; B4.3; B4.4; B4.6; B4.7; B4.8; B4.11; Г7.1; Г8.2; Г8.3]

2. Simulation studies have been conducted to evaluate the environmental, infrastructural and transport effects of different traffic light management policies. The obtained results are applicable for supporting the analysis, comparison and selection of management and infrastructure solutions in a real urban environment. [B4.9; B4.10; Г8.1]

3. Alternative approaches for optimizing the duration of traffic light signals in a real network of intersections have been synthesized and compared, showing improvement over baseline settings with respect to key transport indicators. [B4.11]

4. Applied solutions have been developed in the field of educational technologies and knowledge extraction, including a methodology for the life cycle of educational software, a prototype of an educational game, and the application of methods for analysing dependencies in the management of agricultural facilities. [Г7.3–Г7.7; Г8.4–Г8.9]

### **6. Critical remarks and recommendations**

My critical remarks are directed mainly at the submitted reference report on the contributions, which is presented in excessive detail and would benefit from a more generalized and synthesized form. These observations do not change my positive assessment of the studies and results presented in the publications. I highly appreciate their contribution, as well as their orientation toward problems of significance for society and the economy. As a recommendation for the candidate's future work, I would indicate the continuation of publication activity in high-quartile journals with impact factor/impact rank, which would contribute to further increasing the international visibility and citation impact of the scientific results.

### **7. Significance of the contributions for science and practice**

The candidate's contributions are significant both for the development of scientific research and for practice. The developments in the field of modelling, simulation and management of urban transport systems have clearly expressed engineering applicability and are directed toward current problems related to the optimization of traffic flows, reduction of congestion and support for

management decision-making in an urban environment. The results related to ICT, educational games and STEM approaches are current and useful for educational practice, especially in the context of the digitalization of education and the implementation of innovative educational technologies. The studies aimed at applying knowledge extraction methods in the management of agricultural facilities also deserve a positive assessment. Overall, the submitted publications show a good connection between scientific results, applied orientation and possibilities for practical use.

## CONCLUSION

The candidate in the announced competition, Dr. Yordanka Boneva, Chief Assistant Professor, fully satisfies the conditions, criteria and requirements for holding the academic position of “Associate Professor” in accordance with the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Rules for the Implementation of the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations on the Terms and Procedure for Acquiring Scientific Degrees and Holding Academic Positions at BAS, and the Regulations on the Specific Conditions for Acquiring Scientific Degrees and Holding Academic Positions at IICT–BAS.

Taking into account the above, as well as the overall research and applied research activity of the candidate, I give my positive assessment and confidently recommend that the esteemed members of the Scientific Jury support the election of Dr. Yordanka Lyubomirova Boneva, Chief Assistant Professor, and propose to the Scientific Council of IICT–BAS that she be elected to the academic position of “Associate Professor” in Professional Field 5.2. Electrical Engineering, Electronics and Automation, scientific specialty “Automated Systems for Information Processing and Control”, for the needs of the “Distributed Information and Control Systems” Section at the Institute of Information and Communication Technologies – BAS.

29.04.2026

Sofia

Reviewer: Pro:

