

REVIEW

regarding the competition for the academic position of "associate professor" in the field of "Application of the principles and methods of cybernetics in various areas of science", professional field 5.2 Electrical Engineering, Electronics and Automation, announced in State Gazette No. 66 of 12.08.2025 for the needs of the "Interactive Robotics and Control Systems" section

Candidate: Chief Assistant Dr. Paulina Tsvetanova Tsvetkova

Reviewer: Prof. Velislava Noreva Lyubenova, DSc, Institute of Robotics, Bulgarian Academy of Sciences

1. Brief biographical information

By Order No. 130/07.10.2025 of the Director of the Institute of Robotics, Bulgarian Academy of Sciences, I have been included in the Scientific Jury for the above-mentioned competition. The only candidate is Chief Assistant Dr. Paulina Tsvetanova Tsvetkova from the Interactive Robotics and Control Systems Section.

Chief Assistant Dr. Tsvetkova holds a master's degree in English Language and Methodology from Paisii Hilendarski University, Plovdiv. Her doctoral dissertation is on "Emotional Intelligence and Career Orientation in Early Adulthood" in the doctoral program "Pedagogical and Age Psychology," defended at Paisii Hilendarski University, Plovdiv, in 2022. Dr. Tsvetkova is enrolled in a master's program in artificial intelligence at Burgas Free University for the period 2025–2027.

Dr. Tsvetkova worked as a researcher at the Institute of Psychology at the Bulgarian Academy of Sciences from 2020 to 2022 and as a Chief Assistant from September 2022 to the present at the Institute of Psychology at the Bulgarian Academy of Sciences and at UniBIT-Sofia.

2. General description of the materials submitted

The documents provided to me for the competition contain:

1. Application to the Director of IR-BAS for participation in the competition.
2. Detailed CV in European format in Bulgarian and English.
3. Copy of the diploma for the acquired academic degree "Doctor".
4. List of scientific publications with which the candidate participates in the competition, which do not repeat those submitted for the acquisition of the educational and scientific degree "Doctor".
5. List of scientific publications for the acquisition of the educational and scientific degree "Doctor".
6. List of citations.
7. Abstracts of the scientific publications with which the candidate participates in the competition – in Bulgarian and English.
8. Copies of all scientific publications with which the candidate participates in the competition.
9. Reference for the fulfillment of the minimum national requirements for the academic position of "associate professor" by groups of indicators for NACID.
10. Reference for original scientific and scientific-applied contributions.
11. Completed Declaration 1 and Declaration 2 in accordance with the requirements of the Internal Rules for the Development of Academic Staff at the Institute of Robotics at the Bulgarian Academy of Sciences.
12. Document for the fee paid to the Institute of Robotics at the Bulgarian Academy of Sciences by bank transfer.

The necessary documents for participation in the competition and their content, according to the regulatory framework of the Law on the Development of Academic Staff in the Republic of Bulgaria

(ZRASRB), the Regulations for its implementation, the Regulations on the conditions and procedure for acquiring scientific degrees and occupying academic positions at BAS, and the Regulations on the conditions for acquiring scientific degrees and occupying academic positions at IR-BAS, concerning the conditions and procedure for occupying the academic position of "associate professor," I have no objections.

3. Fulfilment of minimum requirements

Chief Assistant Dr. Tsvetkova has submitted 41 scientific publications for her participation in the competition. Ten of the publications referenced and indexed in world-renowned databases are thematically united and systematized in a work equivalent to a monograph. Of the remaining 21 publications, 10 works referenced and indexed in the world-renowned WoS or Scopus databases are included in group Г7. Group G8 includes the remaining 21 publications.

The review of the publications shows that indicator B scores 185.98 points, which exceeds the required minimum of 100 points. The points from group Г are 230.09, with a minimum of 200 points. The candidate has scored 120 points for citations, with a minimum of 50 points required for this indicator (Д). In addition, there are 9 publications in journals with an impact factor and 6 with an impact rank.

It can therefore be concluded that the candidate meets and exceeds the minimum national requirements for the academic position of "Associate Professor" in accordance with the above-mentioned regulatory documents (Table 1).

Table 1

Gro up	Content	Min points LDASRB	Evidence material	Points Ch. As. d-r Tsvetkova
A	Indicator 1	50	Dissertation	50
B	Indicator 4 Habilitation thesis – scientific publications that are referenced and indexed in world-renowned databases	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)	185.98
Г	Sum of indicators 5 to 9	200	Sum of indicators 5 to 9, publications with numbers 11 to 20 in the list of publications from group G7 and with numbers 21 to 41 from group G8	230.09 (Г7 – 95.37 Г8 – 134.72)
Д	Sum of indicators 12 to 15	50	12 citations of 6 publications in Scopus/WoS	120

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

Of the 41 publications presented, 20 are indexed in WoS and/or Scopus, and 21 articles are published in journals and conference proceedings (unindexed).

Two of the publications are in Q1 quartile publications ([7], [16]), 4 are in Q2 quartile publications ([5], [9], [13], [19]), 3 are in Q3 quartile ([8], [11], [15]), and one is in Q4 quartile ([10]). Four of the publications have a high IF – between 2 and 4 ([5], [7], [13], [16]), and two have an IF between 1 and 2 ([9], [19]). All this proves the high quality of the research and results in the works with which Dr. Tsvetkova participates in the competition.

The candidate has published in the prestigious journals *Machines* (MDPI), *Technologies* (MDPI), *Societies* (MDPI), *Brain Sciences* (MDPI), *Disability and Rehabilitation: Assistive Technology* (Taylor and Francis Ltd.), etc.

Eight of the papers in indexed publications have been published in journals, and 12 as articles in conference proceedings. Most of the publications are co-authored with teams, with no independent publications; in three papers, there are three co-authors, and in the rest, there are more than three co-authors. The publications cover the period 2022-2025, mainly 2023-2025. All of them are after the defense of a doctoral dissertation.

In the period 2023-present, Dr. Tsvetkova has participated in four projects funded by the Scientific Research Fund, two of which are focused on fundamental scientific research ("Innovative methodology for integrating assistive technologies in speech therapy" and "Support for educators: revival of the "Suggestopedia" method through new neuropsychological knowledge about children and adolescents"), with the candidate serving as the project leader for the second project. The other two projects are related to participation in COST actions (EU COST Action No. CA19104 – Promoting social inclusion through technology and support and EU COST Action No. CA23153 – Digital mental health for young people (YouthDMH)).

The topics of these projects are naturally and logically related to Dr. Tsvetkova's scientific interests, as well as to the results in the publications submitted for the competition. They are in the fields of artificial intelligence and social-assistive robots, machine learning and optimization, assistive technologies (AT) and social inclusion, application of social robotics in psychology, etc.

The 10 publications submitted, equivalent to a monographic work, cover results in the fields of artificial intelligence and social-assistive robots [1, 2, 3, 4, 5, 6], applied AI for image processing, etc. [7, 10], as well as processing and various methods for analyzing data from brain-computer interfaces [8, 9].

The remaining publications in group Γ examine and explore the tools of artificial intelligence, generative artificial intelligence, social-assistive robots, and human-AI collaboration to help people with speech and language disorders, anxiety disorders, and communication disorders. Some of the research focuses on image processing, applications of machine learning algorithms, and methods for analyzing electroencephalographic (EEG) signals.

Dr. Tsvetkova is a reviewer for the journals *Frontiers in Robotics and AI*, MDPI, *International Journal of Developmental Disabilities*, and *Frontiers in Psychology*, section "Neuropsychology."

5. Contributions

The candidate has submitted a report on scientific and applied contributions, which I would summarise as scientific-applied contributions and applied contributions as follows:

Scientific-applied contributions

1. Assistive technologies (AT) and social inclusion – future trends

- ✓ Based on a national study on future trends and expectations in the application of artificial intelligence (AI)-based assistive technologies, awareness has been raised and guidelines for the development of emerging AI-based solutions have been formulated. The study covers representatives of organizations of people with disabilities, the academic community, and the practical sphere. A model for the integration of assistive technologies aimed at effective social inclusion has been proposed. – indicator Γ [9]
- ✓ Based on an international Delphi study aimed at identifying future priorities for the social inclusion of people with intellectual disabilities and autism, gaps in accessibility, awareness, and training have been identified. Strategies have been developed to overcome barriers by focusing on personalization, improved accessibility, and changing technological paradigms. – indicator B [9]

2. Neuroscience, pedagogy

An innovative methodology for analyzing fatigue in suggestopedia teachers has been developed through the combined application of electroencephalographic (EEG) measurements and psychological questionnaires. The methodology enables the study of the cognitive and emotional state of teachers and reveals new perspectives for the application of neuroscience approaches in pedagogical practice. – indicator Γ [3].

3. Applied artificial intelligence – image processing and cultural heritage

Image processing techniques using the Python language have been integrated into the educational process through a practical case study – working with ancient manuscripts (palimpsests). Methods such as CLAHE, gamma correction, and Gaussian smoothing have been used. The results contribute to the interdisciplinary enrichment of curricula and the development of practical skills in the field of computer vision. – indicators B [8]; Γ [1], [8]

4. Artificial intelligence and social assistance robots

The functional capabilities of the NAO humanoid robot have been expanded through the implementation of Conversational AI, which allows for more natural communication and therapeutic interaction with children with speech and language disorders. This contribution demonstrates the application of AI in supporting speech therapy and therapeutic activities. – indicator B [6]

Applied contributions

5. Artificial intelligence and social assistance robots

A modular software architecture has been developed for integrating conversational artificial intelligence into social assistance robots (SAR), including the NAO, Pepper, and Furhat models. The architecture is characterized by high modularity and adaptability to various cloud NLP services, which increases its applicability and operational flexibility. – indicator B [4]

6. Application of social robotics in psychology

A new software framework for psychological screening using the Furhat social robot has been developed. This framework provides automation and adaptation of psychological tests, reducing barriers to their application and assisting professionals by objectifying and standardizing processes. – indicator Γ [4]

7. Machine learning and optimization

A comparison of different machine learning classifiers has been performed to predict results in data processing. By applying optimization techniques for hyperparameter tuning (GridSearchCV, RandomizedSearchCV), the higher efficiency and reliability of the Random Forest model compared to alternative approaches have been proven. – indicator Γ [2]

8. Artificial intelligence and social assistance robots

The effectiveness of multi-robot collaboration has been experimentally demonstrated through the use of cloud-based NLP services and the exchange of natural language transcriptions between robots. The results show the potential of social assistance systems for coordinated work in a multi-agent environment. – indicator B [10]

6. Critical comments and recommendations

My critical comments mainly concern the presented list of contributions, which should more accurately reflect the quality of the publications in relation to the relevant scientific and applied scientific results. The candidate has a sufficient number of high-quality scientific publications included in high-impact factor journals and positioned in the first (Q1) and second (Q2) quartiles, which provides a solid basis for a well-argued presentation and defense of significant contributions.

From a technical point of view, there are some gaps and omissions in the list of publications and citations, mainly related to the lack of complete bibliographic data for the citing articles. This does not affect my overall assessment of the research, which is distinguished by its high scientific level and relevance to contemporary trends in the field.

I highly appreciate the results achieved and the focus on topics of growing public importance. I recommend that Dr. Tsvetkova summarise her achievements in an independent scientific monograph, in which she integrates the theoretical and empirical aspects of her research. Furthermore, in view of her accumulated experience, I consider it appropriate for her to continue developing her scientific career as a supervisor or consultant to doctoral students.

7. Significance of contributions to science and practice

The contributions presented by the candidate are of high significance for both science and practice, as they combine theoretical-research and applied approaches in areas of high social relevance. The research conducted in the field of assistive technologies and social inclusion contributes to the deepening of scientific knowledge about the role of artificial intelligence in supporting people with disabilities and formulates conceptual guidelines for future policies and good practices.

The methodologies developed in the field of neuroscience and pedagogy introduce innovative tools for analyzing cognitive and emotional processes that have the potential to improve the educational environment and increase the effectiveness of learning. The integration of artificial intelligence and social robotics demonstrates the applicability of scientific research in real therapeutic, psychological, and educational contexts.

Taken together, the presented results expand the boundaries of contemporary scientific knowledge and offer practical solutions aimed at increasing the accessibility, effectiveness, and humanization of technologies.

8. Personal Impressions

I have known the candidate for several years, without having any joint publications with her. My personal impressions are extremely positive. Dr. Tsvetkova is an erudite, ambitious and responsible researcher, demonstrating a systematic approach to scientific work and a constant striving for professional improvement. She possesses excellent leadership and organizational skills, demonstrated in the management of scientific and project activities, as well as efficiency in a team environment.

These qualities, combined with her professional commitment, research motivation and proven scientific potential, constitute a solid foundation for her future growth and establishment as a promising and recognized scientist.

CONCLUSION

The candidate for the announced competition, **Chief Assistant Dr. Paulina Tsvetanova Tsvetkova**, fully satisfies the conditions, criteria and requirements for holding 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 for the Conditions and Procedure for Acquiring Scientific Degrees and Holding Academic Positions in the Bulgarian Academy of Sciences and the Regulations for Acquiring Scientific Degrees and Holding Academic Positions in the Institute of Robotics, Bulgarian Academy of Sciences. Considering the above and the overall scientific and scientific-applied activity of the candidate, **I give my positive vote and I strongly recommend to the esteemed members of the Scientific Jury to vote positively for her selection, as well as to propose to the Scientific Council of the Research Institute of the Bulgarian Academy of Sciences to elect Chief Assistant Dr. Paulina Tsvetanova Tsvetkova for the academic position of "Associate Professor" in professional field 5.2. Electrical Engineering, Electronics and Automation, scientific specialty "Application of the Principles and Methods of Cybernetics in Various Fields of Science" for the needs of the section "Interactive Robotics and Control Systems".**

November 11, 2025
Sofia

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Reviewer: Prof. DSc. Velislava N. Lyubenova