

OPINION



regarding the competition for the academic position of "Professor"
Professional Field 5.1: Mechanical Engineering,
Scientific Specialty: "Robots and Manipulators,"
announced in the *State Gazette*, Issue 51 of June 5, 2026, for the needs
of the "RiMIS" Section, Institute of Robotics – BAS
Candidate: Assoc. Prof. Dr. Eng. Nina Foteva Valchkova
Prepared by: Prof. Dr. Eng. Pancho Krastev Tomov

1 General information and biographical data.

Nina Foteva Valchkova was born in Pleven. She graduated from the "Anastasia Dimitrova" Secondary School in Pleven in 1977 and subsequently earned a degree in Mechanical Engineering—specializing in Manufacturing Technology and Metal-Cutting Machines—from Angel Kanchev University of Ruse in 1983. Since 1987, Nina Foteva Valchkova has served as a Research Associate (Grade III) at the Research Institute of Robotics in Stara Zagora. Since 1989, she has worked within various units of the Bulgarian Academy of Sciences (BAS), accumulating extensive professional and research experience in the fields of robotics, mechatronics, instrumentation, and intelligent systems. In 2013, while a doctoral candidate at the Institute of Systems Engineering and Robotics (BAS), she successfully defended her doctoral dissertation in the field of "Robots and Manipulators" on the topic: "Parametric Identification and Calibration of a Robot Manipulation System for Model Operator Synthesis via Analysis of the Service Coefficient." Since 2018, she has held the position of Associate Professor at the Institute of Robotics (BAS), within the Robotic and Mechatronic Actuation Systems (RiMIS) section.

The current competition for the academic rank of Professor was announced in the *State Gazette* (Issue No. 51, dated June 5, 2026) to meet the staffing needs of the "RiMIS" section at the Institute of Robotics (BAS). There is only one candidate for the announced position: Assoc. Prof. Dr. Eng. Nina Foteva Valchkova

2 General description of the submitted materials.

For the review process in this competition, Assoc. Prof. Dr. Eng. Nina Foteva Valchkova has submitted a total of 38 publications, which can be categorized as follows:

- Habilitation thesis: "Metrology of Mobile Robots in Healthcare: Methods, Models, Evaluation, and Optimization of Mobile Collaborative Service Robots";
- Scientific publications in journals refereed and indexed in globally recognized scientific databases – 7 items (3 of which appear in journals with an SJR ranking);
- Scientific publications in non-refereed, peer-reviewed journals or in edited collective volumes – 10 items;

These publications do not duplicate those submitted for the acquisition of the Educational and Scientific Degree "Doctor" or the academic rank of "Associate Professor." The arrangement of the publications and their abstracts follows the submitted list and numbering for the competition.

The submitted documents demonstrate that Assoc. Prof. Dr. Eng. Nina Foteva Valchkova acts equally as a researcher, analyst, and practitioner across several scientific fields. This enables her to distinguish herself as a scholar possessing excellent skills and approaches regarding the complex interplay between theory and practice. The submitted documentation confirms compliance with the minimum national requirements—as defined in the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and its implementing regulations—for the academic position of "Professor" in professional field 5.1. For the Mechanical Engineering academic specialization "Robots and Manipulators," the total score is 772.53 against a minimum requirement of 600 points, as shown in the table:

Таблица 1

Group of indicators	Content	Professor	Candidate's total points
A	1	50	50
B	Indicator 3 and 4	100	100
C	Sum of indicators 5 to 11	200	232
D	Sum of indicators 12 to 15	100	156
E	Sum of indicators 16 to 28	150	234,53
	Total points	600	772,53

3 General overview of the candidate's research and applied research activities.

In the materials submitted for review, the style and technical language employed are correct and scientifically accurate. The work demonstrates

theoretical competence and scientific expertise, combined with appropriate mechanical engineering terminology.

In the context of the competition, Assoc. Prof. Dr. Eng. Nina Foteva Valchkova has served as the leader of one international scientific or educational project and one national scientific or educational project, and has participated in two other national research projects. The candidate has submitted two applications for utility models and two patent applications.

The candidate has received 12 citations in scientific publications refereed and indexed in renowned global scientific databases, 24 citations in peer-reviewed monographs and edited volumes, and 42 citations in peer-reviewed non-refereed journals, demonstrating her standing within the scientific community.

4 Main contributions

The candidate has submitted a statement of their contributions, categorizing them into scientific and scientific-applied. I would comment on the proposed contributions as follows:

4.1 Scientific contributions.

SC-1 An original methodology has been developed for the system design of mobile collaborative robots for medical, social, and industrial applications. [1, 2, 5, 6, 7, 15, and 17].

SC-2 An original scientific concept and methodology have been developed for the system design of autonomous mobile collaborative robots. [2, 3, 4, 6, 8, 9, and 10].

SC-3 Original mathematical models have been developed for the parametric synthesis and optimization of mobile robotic platforms. [1, 2, 3, 9, 10, 12, and 16].

SC-4 Original models and algorithms have been developed for the intelligent control of autonomous mobile collaborative robots. [2, 3, 6, 8, 10, and 13].

SC-5 Original models have been developed for multi-sensor perception and information fusion in mobile robotic systems. [2, 3, 5, 6, 8, 10, 14, and 15].

SC-6 Scientific models have been developed for the intelligent control of energy subsystems in autonomous mobile robots, based on hybrid energy sources and hydrogen technologies. [1, 2, 7, 9, 12, and 15].

SC-7 Scientific models have been developed for autonomous medical robotic systems and intelligent field medical stations. [1, 2, 5, 6, 7, 11, and 15].

SC-8 Scientific foundations have been developed for the design of highly mobile robots for operation in unstructured and high-risk environments [1, 2, 3, 6, 10, 13, 15, and 16].

SC-9 The scientific foundations for metrological assurance, experimental verification, and digital modeling of mobile robotic systems have been advanced [2, 9, 10, and 16].

4.2 Scientific - applied contributions.

SAC-1 An engineering methodology for the integrated design of mobile collaborative robotic systems has been developed. [2, 4, 9, 10, and 16.]

SAC-2 Engineering criteria for the selection of mobile platforms have been developed. [2, 6, 9, and 10.]

SAC-3 An engineering methodology for the selection and integration of sensor systems has been developed. [1, 2, 3, 9, and 14.]

SAC-4 Algorithms for the intelligent control of mobile robots have been developed. [1, 3, 6, 8, 9, 10, and 14.]

SAC-5 Engineering models for energy flow management have been developed. [4, 7, 9, and 12.]

SAC-6 Engineering solutions for autonomous medical stations have been developed. [1, 2, 5, 6, 7, 11, 16, and 17.]

SAC-7 Engineering solutions for high-mobility robots have been developed. [2, 3, 6, 10, 13, and 15.]

SAC-8 Engineering models for digital twins have been developed. [2, 9, and 10.]

SAC-9 Engineering methodologies for experimental evaluation have been developed. [2, 4, 7, 9, and 10.]

SAC-10 Engineering solutions for the integration of robotic systems into medical practice have been developed. [1, 2, 5, 6, 7, 11, 15, 16, and 17]

4.3 Applied contributions.

AC-1 Mobile collaborative robotic platforms for medical, social, and specialized applications have been developed and experimentally validated. [1, 2, 3, 6, 7, 10, 13, and 15].

AC-2 Experimental systems for multi-sensor perception and autonomous navigation have been implemented. [2, 3, 6, 14, and 15].

AC-3 Intelligent control systems for mobile robots have been implemented. [1, 3, 5, 6, and 15].

AC-4 Hybrid energy systems utilizing hydrogen fuel cells have been implemented. [4, 7, 9, and 12].

AC-5 Experimental models of autonomous field medical stations have been implemented. [1, 2, 5, 6, and 15].

AC -6 High-mobility mobile robots for specialized operations have been implemented. [1, 2, 3, 6, 9, 13, 15, and 16.]

AC -7 Digital models and virtual experimental environments for robotic systems have been developed. [1, 2, 3, 6, 9, 10, and 16.]

AC -8 The developed research results have been integrated into research and educational activities. [1, 2, 3, 8, 16, and 17.]

I accept the presented scientific and applied-scientific contributions of Assoc. Prof. Dr. Eng. Nina Foteva Valchkova.

5 Significance of the contributions to science and practice

The contributions are significant for both science and practice. In my assessment, these contributions are the candidate's own work and are significant for theory and practice. I consider that the scope and quality of the candidate's research and applied scientific activities fully meet the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation. The quantitative criteria for appointment to the academic position of "Professor" have been met.

6 Critical remarks and recommendations

I have no significant critical remarks that would call into question the candidate's fundamental scientific and applied-scientific contributions.

Citations within the dissertation itself are excluded from the point calculation for Group D14, as a dissertation does not qualify as a "peer-reviewed journal." These references may, however, remain as evidence of the utilization of the works. The final total for Group D has been recalculated based on the original list of citations. Critical remarks may be made regarding the terminology used in certain works, uncorrected technical errors, and other minor issues. I recommend that the candidate increase their independent publication activity, given that only three of the submitted works are single-authored. I also recommend continuing to publish actively in reputable international journals relevant to the competition's subject matter and the candidate's scientific interests.

7 Conclusion

The scientific works presented by the candidate demonstrate significant scientific and applied scientific contributions. The candidate's achievements in practical work are also highly commendable.

All requirements set forth in the "Regulations on the Conditions and Procedure for Occupying Academic Positions" at the Institute of Robotics of the Bulgarian Academy of Sciences (IR-BAS) have been met. All necessary documents and supporting materials have been submitted. The presented works are of the required scientific standard and address a subject matter that fully aligns with the requirements of the competition for Professional Field 5.1 "Mechanical Engineering." Regarding the minimum national requirements established by the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and its implementing regulations for the academic position of "Professor" in Professional Field 5.1 "Mechanical Engineering," the candidate's achievements exceed the minimum thresholds. Sufficient scientific and applied scientific contributions have been realized; through this, the candidate convincingly demonstrates sound knowledge and the application of modern research methods in scientific inquiry and analysis.

In view of the above, I consider it justified to provide a **positive** assessment and recommend that the Scientific Jury prepare a report proposing to the management of IR-BAS the appointment of Assoc. Prof. Dr. Eng. Nina Foteva Valchkova to the academic position of "Professor" in Professional Field 5.1 "Mechanical Engineering," specializing in "Robots and Manipulators."

Sofia

Prepared by:

October 2, 2026

/ Prof. Dr. Eng. P. Tomov /