

REVIEW

by

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ABOUT

scientific papers and documents for participation in a competition for the academic position of "professor"

Field of higher education: 5 "Technical sciences,"

Professional field: 5.2 "Electrical Engineering, Electronics and Automation",

Specialty: "Robots and manipulators",

announced in SG no. 21 of 15.03.2022 for the needs of section "Cyber-physical systems"

at the Institute of Information and Communication Technologies - BAS

with the only candidate in the competition: Assoc. Prof. Dr. Nayden Nedkov Shivarov.

By Order of the Director of IICT-BAS № 133 from 13.05.2022, I have been confirmed as a member of the Scientific Jury in the competition for the academic position of "professor", announced in SG no. 21 of 15.03.2022. By decision of the Scientific Jury at a meeting held on 23.05.2022, my participation in the work of the jury was determined by preparing a review of the submitted materials.

Evaluation of the candidate

I. Grounds for the evaluation and general characteristics of the submitted materials

As a member of the Scientific Jury, I have received the following documents and papers from the candidate, on the basis of which this review has been prepared:

1. autobiography according to European model;
2. a copy of the diploma for the educational and scientific degree "Doctor" and a certificate from the Higher Attestation Commission;
3. a copy of the certificate for holding the academic position "Associate Professor";
4. certificate for internship in the specialty;
5. list of the scientific publications for participation in the competition;

6. list of inventions and other scientific-applied results;
7. list of citations;
8. summaries of scientific publications for participation in the competition - in Bulgarian and English;
9. copies of the scientific publications for participation in the competition;
10. reference for fulfillment of the minimum requirements of IICT;
11. reference for the original scientific and applied scientific contributions;
12. declaration that there is no proven plagiarism in the scientific works according to the statutory order;
13. additional documents: awards, certificates and certificates.

The submitted documents and scientific papers of the candidate fully meet the requirements for admission to the competition for the academic position of "professor", defined by Art. 29 of the ZRASRB and Art. 10, par. 1 (1) of the Regulations on specific conditions for acquiring scientific degrees and for holding academic positions at the Institute of Information and Communication Technologies.

II. Compliance with minimum national and IICT requirements

The presented Report on the fulfillment of the minimum national requirements and the requirements of IICT-BAS includes data on:

- habilitation thesis - scientific publications in editions that are referenced and indexed in world-wide databases with scientific information - 10 issues;
- published monograph, which is not presented as a habilitation thesis - 1 issue;
- scientific publications in editions that are referenced and indexed in worldwide databases with scientific information - 13 issues;
- scientific publications in unrefereed journals with scientific review or in edited collective volumes - 10 issues;
- citations in scientific journals, referenced and indexed in world-wide databases with scientific information, or in monographs and collective volumes - 17 issues;
- participation and management of scientific projects, attracted funds in projects led by the applicant, as well as a recognized patent for an invention with inventor Dr. Nayden Shivarov.

The report has been correctly prepared and the presented data convincingly show that the candidate has fulfilled and exceeded the requirements for holding the academic position of "professor" in all indicators as follows.

Indicator B: achieved number of points 178.5 with a minimum required number of 100 points,

Indicator Г: achieved number of points 279.58 with a minimum required number of 220 points,

Indicator Д: achieved number of points 170 with a minimum required number of 120 points,

Indicator E: achieved number of points 227 with minimum required number of 150 points.

III. Research and applied activity

The research activity and the results obtained in the presented papers are concentrated mainly in the field of control of service robots and robotic manipulators, autonomous mobile robots, remote-controlled robots and training robots. Prototypes of a training mobile robot, a tele-controlled service robot, a companion robot for people with disabilities and a robotic manipulator for rehabilitation procedures have been studied, developed and tested. The constructed prototypes have implemented author's developments of modules and software for intelligent robot control, web-based user interface for control and maintenance of robotic platforms. The candidate's research activities also include the development of modern technologies and the construction of cyber-physical systems in the field of intelligent animal husbandry and remote monitoring in hospital care. The successful scientific and research activity of the candidate in the field of robotics has been recognized in the patent issued in 2019 for the invention "Autonomous Personal Service Mobile Robot", with inventor Naiden Shivarov.

The participation of Assoc. Prof. Dr. Nayden Shivarov in the development and management of national and international research and educational projects also deserves a positive assessment of his research activity. In the period 2016-2021 he participated in the development of one national and one international project and he has been the leader of the Bulgarian team in one international and one national research project.

The listed results undoubtedly show that the candidate has in-depth knowledge, high competence and experience in the development of robots and robotic systems, the use of modern intelligent methods and artificial intelligence in building and managing cyber-physical systems, as well as experience in leadership and implementation of research projects.

IV. Publishing activity and citations

The scientific works of the candidate submitted for review includes 34 scientific papers, of which 1 monograph (2020), 23 publications in editions referenced in SCOPUS and 10 publications in scientific peer-reviewed editions. The presented publications do not repeat the works of the candidate in the procedures for obtaining the educational and scientific degree "Doctor" and for holding the academic position "Associate Professor". One of the publications is from 2010, and all other publications are in the period 2019-2021, which shows the active research and publishing activities of the candidate in the last few years. In general, the presented works contain original scientific and scientific-applied results, which demonstrate innovative thinking and capabilities of the author and the author's teams to successfully solve the considered research problems.

In the presented list of citations, all citations of the candidate's works are in the works of foreign authors in prestigious publications, which are indexed and referenced in the Scopus scientific information database. The cited works are also published in well-known international organizations, such as IFAC Papers-OnLine, IEEE, Computing and Informatics magazine, etc. Thus, significant results in the research activities of the candidate have obviously aroused interest and have become available to scientists in the field of robotics internationally.

V. Main scientific and scientific-applied contributions

I accept and appreciate the contributions formulated in the author's report of the candidate. In summary, they are divided into the following groups.

1) Contributions in the field of robotics and robotic systems.

- Developed, prototyped and tested is a training mobile robot "NITROBOT", implemented for the purposes of STEM training in Bulgarian schools (publications № 6, 8 and monograph № 11);
- A service robot for storage and delivery of finished products has been developed, prototyped and tested (publications № 9, 12, 13, 14, 15, 25, 26);
- A specialized gripper - dispenser for dosing a laboratory mill with grinding bodies has been designed, developed and 3D prototyped (publications № 5, 18);
- A "grill" type manipulator was designed, developed and tested for rehabilitation of upper limbs in hospital care (publications № 4, 34);

- A robot companion has been developed and researched to improve the quality of life of people with disabilities (publications № 1, 3, 17, 22 29, 33);

2) Contributions to the development and application of cyber-physical systems and the use of artificial intelligence.

- A cyber-physical system for intelligent management of animal husbandry complexes has been developed (publications № 20, 24);

- A cyber-physical system for remote monitoring and tele-medical examinations in hospital care has been developed (publications № 7, 10, 23, 30);

- Algorithms using artificial intelligence for automatic recognition of faces and objects with application in a personal service robot "YOLO" (You Only Look Once) for recognition and classification of objects in real time have been studied and implemented (publication № 19);

The listed scientific and scientific-applied contributions fully correspond to the scientific specialty of the competition "Robots and Manipulators". They characterise the candidate as a highly qualified specialist in the field of robotics and cyber-physical systems, both in terms of their design and development, and in connection with their practical implementation.

VI. Significance of the contributions to science and practice

As a whole, the scientific and applied contributions in the candidate's work can be assessed as enriching existing knowledge, developing new and improving known methods and approaches in the fields of service robotics, robotic manipulators and cyber-physical systems. From a practical point of view, the candidate's developments undoubtedly contribute to the wider implementation and expansion of applications of robotics, intelligent systems and artificial intelligence in education, production technology, rehabilitation and improving the quality of life of people with disabilities.

VII. Assessment of the degree of personal participation of the candidate in the contributions

I personally know the candidate Assoc. Prof. Dr. Nayden Shivarov and I have direct impressions of his scientific, research and applied activities. My acquaintance with his publications, monographic work and applied works, as well as my impressions of the overall research work of Dr. Nayden Shivarov give me reason to believe that the declared scientific and scientific-applied

contributions are his personal work. I am not aware of any evidence of plagiarism in the works presented.

VIII. Opinion, critical remarks and recommendations

The scientific works of Assoc. Prof. Dr. Nayden Shivarov, presented for evaluation in this procedure provide evidence for systematic and in-depth research and applied activities in the fields of robotic and cyber-physical systems, their design, development and practical implementation. The scientific works contain original results of high scientific and applied value and are essential for the development and enrichment of the theory and practice in the professional field of the competition. In terms of volume and quality, the results obtained exceed the normative requirements for holding the academic position of "professor".

I have no critical remarks on the competition documents and works of the candidate. Given the importance of the issues and the results obtained, my recommendation to the candidate is both for continuing the research and for more active participation in the training of doctoral students and young scientists in the field of robotics.

CONCLUSION

Given the overall research, publication and applied activities of the candidate, I give a positive assessment of the documents and works submitted for the competition by Assoc. Prof. Dr. Nayden Shivarov. All the requirements of the ZRASRB, the Regulations for its implementation and the Regulations for the specific conditions for acquiring scientific degrees and for holding academic positions at IICT-BAS have been met. I confidently suggest to the esteemed Scientific Jury to vote positively for the election of Assoc. Prof. Dr. Nayden Shivarov for the academic position of "Professor" in the professional field 5.2 "Electrical Engineering, Electronics and Automation", specialty "Robots and Manipulators" in Section "Cyber-physical systems" at IICT-BAS.

06.06.2022

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