

OPINION

Competition for Academic Position "Associate Professor"

in area **5. "Technical Sciences"**,
Professional field **5.2 "Electrical engineering, Electronics and Automation"**
Scientific specialty: **"Automated systems for information processing and management (integration of data from sensor networks)"**

for the needs of the **Unmanned Robotic Systems Laboratory**, announced in State Gazette issue 85 of October 10, 2023 by the Institute of Robotics – BAS (IR-BAS)

with a single candidate: **Senior Assistant Professor Ph.D. Alexander Kirilov Alexandrov** from IR-BAS

Member of the Scientific Jury, Order No 153/13.12.2023 **Assoc. Prof. Dr. Vera Angelova Angelova-Dimitrova**, Institute of Information and Communication Technologies – BAS, Sofia 1113, "Acad. G. Bonchev" Str., bl. 2.

Senior Assistant Professor Dr. Alexander Kirilov Alexandrov has submitted all necessary documents, references and declarations under the Law on the Development of Academic Staff in the Republic of Bulgaria (LDAS in the Republic of Bulgaria), the Regulations for its implementation, the Regulations for the Acquisition of Scientific Degrees and Academic Positions at the Bulgarian Academy of Sciences and the Regulations the Rules for the Development of the Academic Staff of the Institute of Robotics at the Bulgarian Academy of Sciences. The candidate participates in the competition with habilitation work – monograph, 7 publications, presented in full text and a list of 7 citations.

1. Compliance with the requirements of art. 53, para. 1, Regulations for implementation of LDAS in RB

a) p. 1 and 2

Senior Assistant Professor Dr. Alexander Kirilov Alexandrov obtained his PhD in the specialty "Informatics and Computer Science" in 2017 at IICT-BAS. From 2018 until 2023 he was a Senior Assistant Professor Ph.D. at IICT-BAS. Since 2023 he has held the academic position of Senior Assistant Professor at the Institute of Robotics at the Bulgarian Academy of Sciences.

b) p. 3 and 4

The full-text habilitation work - monograph and 7 publications presented for the competition were published after 2017 - the year of acquiring the Ph.D. degree. The habilitation work is an independent monograph of 260 pages, the 7 publications are co-authored, accompanied by protocols for scientific contribution between the authors of each publication. According to the author's contribution protocols, the contributions of Senior Assistant Professor Dr. Alexander Kirilov Alexandrov in 6 of the publications is 88% and in one of the publications – 82%. Of the seven publications participating in the competition, 6 are visible in the world scientific database Scopus.

Senior Assistant Professor Dr. Alexander Kirilov Alexandrov participates in the competition with a list of 7 independent citations. All 7 citing sources are visible in the world scientific database Scopus.

The number of points by indicators of the submitted publications and citations exceeds the minimum national requirements (minimum requirements of IR–BAS) by groups of indicators Γ and Δ :

Group of indicators	Minimum required, NACID	Minimum required, IR – BAS	Submitted for participation in the competition	Adjusted number of points
A	50	50	50	50
B	100	100	100	100
Γ	200	200	223,8	226.4
Δ	50	50	63	70

Table 1. Number of points per indicator

c) p. 5

Senior Assistant Professor Dr. Alexander Kirilov Alexandrov has no proven plagiarism in scientific works.

1. Evaluation of the scientific and applied activities of the candidate and contributions in the materials submitted for review

The scientific and applied results of the candidate's contribution are in the field of wireless sensor networks. This is also the topic of the monograph "Wireless Sensor Systems. Architecture and Communication Protocols", published by the Academic Publishing House "Za Bukvite – O Pismeneh" in 2023.

The scientific results are:

- Developed mathematical models and algorithms for optimization of the energy efficiency of wireless sensor networks by:
 - Parallel processing of sensor node data with generalized networks [1, chapter 5 of the monograph]
 - Multicriteria optimization [2, chapter 6 of the monograph]
 - State-Action-Reward-State-Action (SARSA) algorithm [3]
 - Q-Learning algorithm [7]

The applied results are:

- Developed techniques for energy optimization of
 - communication protocols [4, 6]
 - routing protocols [6]
- Improve the accuracy of the mobile positioning approach with Bluetooth Low Energy indoors.

In his scientific papers, the candidate demonstrates a high level of competence in the detailed description and analysis of the properties and application of wireless sensor devices; modern communication standards and protocols based on them, as well as in-depth knowledge in the study of methods for building the architecture and topology of wireless sensor networks. The results obtained are concrete and practically applicable and confirm the significance of the candidate's contributions.

I have no critical comments or recommendations.

Conclusion

The documents and materials submitted by Senior Assistant Professor Dr. Alexander Kirilov Alexandrov, meet the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for the Application of the Law on the Implementation of the Law on Academic Staff in the Republic of Bulgaria, the Regulations on the Terms and Conditions for the Acquisition of Scientific Degrees and Positions at the Bulgarian Academy of Sciences, and the Rules for the Development of the Academic Staff of IR-BAS. Achieved by Senior Assistant Professor Dr. Alexander Kirilov Alexandrov results correspond and in two of the groups of indicators - exceed the minimum national requirements (the requirements of IR-BAS) for occupying the academic position of Associate Professor.

Based on the submitted documents and scientific works and the analysis of their significance and the contributions contained therein, **I give a positive conclusion about the selection of Senior Assistant Professor Dr. Alexander Kirilov Alexandrov to the academic position of Associate Professor at IR-BAS** and recommend to the Scientific Jury to propose to the Scientific Council of IR-BAS **Senior Assistant Professor Dr. Alexander Kirilov Alexandrov** for the election of the academic position of Associate Professor at IR-BAS, for the needs of the Unmanned Robotic Systems Laboratory, in professional field 5.2 "Electrical Engineering, Electronics and Automation", specialty: "Automated Information Processing and Control Systems".

Feb 9, 2024
Sofia

Prepared the opinion:

/Assoc. Prof. Dr. Vera Angelova/