R E V I E W

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PF 4.6 "Informatics and computer science"

About:

competition for a **professor** in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.6 "Informatics and computer sciences", (Informatics), announced by IICT-BAS

1. Information about the contest

The competition was announced in SG No. 103 of 12.12.2023 for the needs of the "Modeling and Optimization" section of IICT-BAS. I participate in the composition of the scientific jury for the competition according to Order No. 41/09.02.2024 of the Director of IICT-BAS. At the first meeting of the Scientific Jury, I was chosen to prepare a review. As a result of the competition, I received a complete set of documents electronically.

2. Information about the candidate in the competition

To participate in the competition, the only candidate, Assoc. Prof. PhD Tatyana Vladimirovna Atanasova, submitted documents.

Assoc. prof. Atanasova is a doctor of the VAK in Application of the principles and methods of cybernetics in various fields of science, certified by diploma number 27553 from 31.10.2001, confirmed by Protocol 13 of committee 05 from 09.07.2001 with the topic of the dissertation work: Study of control systems with distributed intelligence. Since 04.05.2003 he has held an Academic position: Senior Research Associate II degree at the Institute of Information Technologies of the BAS, assigned act: 21861. Since 03.01.2011 he has held an Academic position: Associate Professor in Professional field: 5.2. Electrical Engineering, Electronics and Automation at the Institute of Information and Communication Technologies - BAS, appointed by act 38 of 18.01.2011. From 18.09.2017 to 01.07.2018 he held an

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academic position: Associate Professor at Southwest University "Neofit Rilski", in Technical faculty, department "Communication and computer technology and technologies" by Professional field: 5.2. Electrical engineering, electronics and automation.

This information is visible in the profile and in NACID.

3. Fulfillment of the requirements for occupying the academic position

The candidate Assoc. prof. Ph.D. Tatyana Vladimirovna Atanasova has submitted 3 scientific publications for participation in the competition to meet the requirements of indicator B, one of which is with IF and Q1, one with IF and Q2 and one with SJR. According to indicator D, 17 scientific publications are provided, one of which is with IF and Q1, 10 are with SJR and 6 are in publications that are referenced and indexed in Web of Science and Scopus. Indicators from group D are covered with a provided reference for 67 citations of 2 scientific publications. Indicators from group E are covered by provided references for 4 successfully defended PhD students, 3 participations in national research projects, 1 participation in an international project and 3 leaderships of teams in an international project.

The provided scientific works were not used by the candidate in previous procedures for acquiring the Doctorate of the National Academy of Sciences and for the occupation of the academic position of "associate professor".

The candidate in the competition fulfills the minimum national requirements for "Professor" in Field 4. Natural Sciences, Mathematics and Informatics, PN 4.6 Informatics and Computer Science, as shown in the table below:

A group of metrics	Content	Professor	Assoc. Prof. PhD Tatiana Vladimirovna Atanasova
A	Indicator 1	50	50
	Indicator 2	--	--
B	Indicators 3 or 4	100	165
G	Sum of indicators from 5 to 10	200	483

A group of metrics	Content	Professor	Assoc. Prof. PhD Tatiana Vladimirovna Atanasova
D	Sum of points in indicator 11	100	536
E	Sum of the indicators from 12 to the end	100 for PF 4.6	420
	Total:	550	1654

A reference made by Scopus, Web of Science, Google Scholar and ResearchGate as of 18.03.2024 shows the following scientometric indicators for the candidate:

Scopus: H-index 7, articles 52, citations 201

Web of Science: H-index 4, articles 28, citations 67

Google Scholar: H-index 11, Citations: 594

ResearchGate: H-index 9, Citations: 366

The analysis shows that **Assoc. prof. PhD Tatiana Vladimirovna Atanasova** fulfills the minimum national requirements for a "professor" in professional field 4.6 Informatics and computer sciences.

4. Evaluation of teaching and learning activity

Assoc. prof. PhD Tatyana Atanasova has attached references from the South-West University "Neofit Rilski" for reading lectures in the academic year 2017-2018 in the disciplines "Data Transmission and Computer Communications", "Digital Communications", "Next Generation Networks", as well as a reference from the Higher School of Telecommunications and Posts for conducting lectures and exercises in the period 2010-2016 in the disciplines "Higher Mathematics", "Mathematical Modeling", "Communication Chains", "Mathematical Methods in Economics" and "Engineering Mathematics 1".

5. Description of the presented scientific works

The scientific developments of the candidate are in the field of informatics and computer sciences and are dedicated to research, development and application of methods

and processes for collecting, storing, processing, transmitting, analyzing and evaluating information with the help of computer technologies.

In the direction "Methods and processes for collecting, analyzing, modeling and applying information", research is aimed at:

1) Internet of Things (IoT) - in publications B4-3, G7-6, G7-10, G7-12, G7-14, G7-17.

2) Cloud computing - in publications B4-1, B4-2, G7-2, G7-5.

3) Modeling, analysis and classification of data - in publications G7-1, G7-3, G7-7, G7-11, G7-13, G7-15.

In the "Vulnerability assessment and protection of computer systems and data" direction, various possibilities of protection of computer systems and the Internet have been studied. The studies are presented in publications - G7-4, G7-8, G7-16.

In the "Virtual and augmented reality (VR and AR) for educational purposes" direction, models have been developed for the application of virtual educational resources for certain target groups, examples and approaches have been developed, allowing their effective application in the educational process. The research is presented in publication - G7-9.

These scientific directions fully correspond to professional direction 4.6 Informatics and computer sciences, for which the competition is announced.

6. Evaluation of the main scientific and scientific-applied contributions of the candidate

The scientific contributions are:

An intelligent system for monitoring target parameters in a cloud environment has been developed.

An approach is proposed to stream heterogeneous data from IoT devices to interactive reports along with embedded machine learning models.

A multidimensional health status classification of dairy cows is proposed using data processing, machine self-learning and cloud services.

An extensible IoT architecture model is proposed to work with different communication protocols, enabling centralized device management and big data processing capabilities.

A set of methods has been developed for collecting, organizing and grouping data

from heterogeneous sources on the Internet according to predefined rules and user requirements.

A cognitive approach to modeling human-computer interaction in a distributed information environment is proposed.

Scientific-applied contributions are:

A scalable cloud-based architecture for an intelligent livestock monitoring system has been implemented, following the Agile methodology and including monitoring of animals' environment, health, growth, behavior, reproduction, emotional state and stress levels.

A methodology has been developed for the implementation of a workflow when working with heterogeneous data on the example of a modular IoT system by applying several methods for processing heterogeneous data.

A digital twin modeling and simulation solution has been developed for smart agriculture in a cloud environment.

Properties and areas of application of self-learning machine learning methods enriched with ensemble methods for boosting, stacking, and bundling are systematized.

Methods for building models in an open-source machine learning software environment are explored and capabilities for finding hidden dependencies in collected datasets are identified.

The security aspects of IoT devices and systems with possible breach paths and countermeasures have been investigated and determined.

An approach is proposed that combines TSA and Blockchain technologies to ensure data traceability in an IoT system.

A correlational approach is proposed to identify indirect relationships between different types of incidents in a converged information infrastructure with the introduction of artificial intelligence for IT operations.

A positive effect of using virtual and augmented reality technologies on the learning ability of STEM learners has been investigated and found.

A composition of atomic functions in different IoT services is proposed when modeling information services with a view to ensuring QoS.

7. Main criticisms and recommendations

I take the liberty of recommending Assoc. prof. Tatyana Atanasova to publish a monographic work based on her scientific developments.

8. Personal impressions of the candidate

I have known Assoc. Prof. Atanasova for more than 20 years. During this period, I have repeatedly had the opportunity to convince myself of her ability to generate new ideas and implement them, as well as her high professionalism in the field in which she works. I have no publications in common with Assoc. Prof. Tatiana Atanasova so far.

9. Conclusion

Based on the outstanding contributions of the candidate, I believe that all the requirements and criteria of the Law on the Development of the Academic Staff of the Republic of Bulgaria, the Regulations for its Application and the specific criteria of IICT-BAS have been met and I give a fully convinced positive assessment for the election of Assoc. prof. PhD Tatiana Vladimirovna Atanasova for the academic position of "Professor" in professional field 4.6 Informatics and computer sciences.

I propose to the respected Scientific Jury to support the candidate and to vote on a proposal to the Scientific Council of IICT-BAS to elect Assoc. prof. PhD Tatiana Vladimirovna Atanasova for the academic position of "Professor" in professional field 4.6 Informatics and Computer Sciences, (Informatics) for the needs of Section "Modeling and Optimization" of IICT-BAS.

22.03.2024
Sofia

На основание
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