Институт по информационни и комуникационни технологии-БАН
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OPINION

Subject: Participation of *Chief Assistant Svetozar Valeriev Ilchev, PhD* in a competition for attaining the academic position of "Associate Professor" in professional field 5.3. Communication and computer technology, announced in SG, issue 68 of 31.07.2020, for the needs of department "Communication Systems and Services" by member of the Scientific panel: *Assoc. Prof. Rumen Dimov Andreev, PhD*

1. Compliance with legal requirements

The competition was announced in "State Gazette", issue 68 of 31.07.2020, for the needs of IICT-BAS, department "Communication Systems and Services". The only candidate is Chief Assistant Svetozar Valeriev Ilchev, PhD. As a member of the Scientific panel appointed by order no. 185 of 02.10.2020 of the Director of IICT-BAS pursuant to Art. 4, para. 2 of the Act on Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and a decision of the Scientific council of IICT (minutes no. 9 of 30.09.2020), I have received a complete set of documents that meet the requirements for attaining the academic position of "Associate Professor". According to the requirements of the "Regulations of specific conditions for attaining scientific degrees and for holding academic positions at IICT-BAS", candidates for the academic position of "Associate Professor" in scientific field "Technical Sciences" and professional field 5.3 Communication and computer technology must have scientometric indicators exceeding the following minimum thresholds: *for group of indicators B* - 100 points and minimum 10 publications in editions that are referenced and indexed in Scopus or WoS; *for group of indicators C* - 220 points; *for group of indicators D* - 60 points; *for group of indicators E* - 20 points.

The points calculated by the candidate for all indicators, which I accept without any remarks, are: *for group of indicators B* - 235.5 points and 12 publications are presented in editions referenced and indexed in Scopus or WoS; *for group of indicators C* - 270.8 points; *for group of indicators D* - 148 points; *for group of indicators E* - 220 points. The candidate satisfies the formal requirements of the Regulations and exceeds them significantly considering all indicator groups.

2. Short biographical information about the candidate

Chief Assistant Svetozar Valeriev Ilchev graduated with a master's degree from the Technical University of Karlsruhe, Germany in 2009. In 2014, he defended his doctoral dissertation at IICT-BAS. He was an intern working on the automation of software quality control processes at SAP Labs, Sofia in 2006 and at the IBM Research and Development Laboratory, Boebligen, Germany in 2007 – Information Technology. He was a scholarship holder of the German Academic Exchange Service (DAAD) for the period 2007-2009. From 2009 to 2012, he was an assistant at the Karlsruhe Institute of Technology, Germany. *Since 2014, he has been Chief Assistant at IICT-BAS.* Chief Assistant Ilchev, PhD regularly reviews materials submitted for publication to journals with impact factor and impact rank published by IEEE, Springer and CIT / an IICT-BAS journal /.

3. General description of the scientific research and applied activity of the candidate

For participation in the competition, Chief Assistant Svetozar Ilchev has presented a total of 25 scientific publications. Among them are a monograph, which is not a main habilitation work, and a book based on a dissertation. Both are published by the "Prof. Marin Drinov" Academic Publishing House, Sofia.

The candidate has provided 18 noted citations, 14 of which are in publications visible in the global scientific databases Scopus and Web of Science and 4 of which are in unreferenced peer-reviewed scientific journals.

Chief Assistant Svetozar Ilchev, PhD has participated in 2 international research projects, 1 national research project and 1 international educational project. He is an author of 4 inventions registered at the Patent Office of the Republic of Bulgaria: 1 patent and 3 utility models.

3.1. Publications related to the habilitation work

The habilitation work of the candidate is in the field of Internet of Things (IoT). It focuses mainly on the two basic levels that ensure the existence of IoT: the communication level and the level of devices that are integrated into the Internet. One of the results of the interaction of these two levels are sensor networks, which collect and integrate sensor data. The capabilities of neural networks are used to process and analyze these data. As part of the habilitation work, research is presented, which is related to the provision of information security at the application level of IoT.

Pursuant to Art. 25, para. 1, item 3 of the ADASRB, the habilitation work is defended with 12 scientific papers published in editions that are indexed and referenced in world-famous databases of scientific information (Scopus and Web of Science). Two of the publications are published in journals with SJR impact rank falling into the Q3 and Q4 journal groups, respectively. Eight of the scientific publications are conference papers published in proceedings of scientific fora abroad: 4 of them fall into the Q groups of editions with impact rank - Q2 (1), Q3 (1) and Q4 (2), and the remaining 4 are with SJR impact rank. Two publications are collections of works of scientific fora indexed in Scopus.

It should be noted that Chief Assistant Svetozar Ilchev is the first author in 6 of the publications. Four of the scientific works are co-authored with another scientist, 3 - co-authored with 2 others, 2 publications – co-authored with 3 others, and 3 scientific works are the result of a team of 7 authors.

3.2. Publications supplementing the habilitation work

The publications belonging to this group can be subdivided as follows:

- Monograph, which is not presented as a main habilitation work and is published by the "Prof. Marin Drinov" Academic Publishing House, Sofia - 1 pcs.;
- Book based on a defended dissertation for the scientific degree "Doctor" published by the "Prof. Marin Drinov" Academic Publishing House, Sofia - 1 pcs.;
- Scientific publications in editions referenced and indexed in Scopus - 3 pcs.;

- Scientific publications in peer-reviewed scientific journals not referenced in Scopus and Web of Science - 8 pcs.

4. Main scientific and applied contributions

Chief Assistant Svetozar Ilchev has presented a detailed reference of the contributions resulting from his research that are reflected in the presented publications and registered inventions. They are related to the following scientific fields: Internet of Things in the industry, information security at the application level of IoT and neural networks for data analysis and processing. The contributions are divided into two groups: scientific and applied.

4.1. Scientific contributions

The contributions in the field of Internet of Things are related mainly to the following subareas:

- Modeling of sensor networks: A model of low-power wireless sensor networks has been created and studied in order to evaluate the energy consumption of wireless sensor nodes; a new method for modeling and simulation of the parallel integration of sensor data in wireless sensor networks has been developed;
- Research of an environment for remote monitoring and control: a new concept for communication between microcontrollers with wired and wireless connectivity has been developed, as well as a strategy for packet routing in IoT-networks; a new method is proposed, which is based on a combination of an advanced Kalman filter and an algorithm for "extreme machine learning" in order to predict climatic parameters;
- Security of the exchange of multimedia files on the Internet through technologies in the field of steganography and digital watermarking: a concept has been developed to create modular methods for data hiding; a new approach to steganalysis based on correlation has been developed.

The contributions in the field of neural networks are: an information model of a biological neuron has been developed, which includes three main characteristics of the cell that directly determine the way of information processing within its body: the synaptic connections, the cell membrane and the reaction of the cell soma depending on the summary input signal; an original method for pre-processing and classifying objects using a neural network, whose goal is to achieve a high recognition rate.

4.2. Applied contributions

The following applied contributions from the field of Internet of Things can be listed:

- A new IoT platform called HybridNET has been developed, which uses different types of wired and wireless communication to control devices and collect sensor data;
- An original mobile system for remote monitoring of the environment has been developed, which uses a platform for analysis and search of dependencies in the sensor data in order to detect various anomalies in the environment in real time;

- Original drivers have been developed, which control various parameters of positioning and mobile laser devices for industrial and multimedia applications;
- New services for digital watermarking and steganographic analysis have been developed, which are integrated with the software of public web portals on the Internet;
- A method for pre-processing images (photos) of single objects based on neural networks is presented. A partially invariant description of the object based on a radial profile of its contour is obtained through this method.

5. Critical remarks and recommendations

A necessary recommendation is related to the structure of the reference to the original scientific and applied contributions:

- The candidate has not grouped the declared contributions into scientific and applied ones;
- The scientific and applied contributions related to the development of a given platform or system are too fragmented, as the candidate wanted to emphasize his principle merit in the creation of the individual components.

CONCLUSION

The candidate **satisfies the requirements of the ADASRB and the Regulations on the Implementation of the ADASRB**. The quantitative indicators of the Regulations of IICT-BAS for holding the academic position of "Associate Professor" are satisfied. I give my **positive vote** for Chief Assistant Svetozar Valeriev Ilchev, PhD to attain the academic position of "Associate Professor".

I propose to the members of the Scientific panel to vote for awarding the academic position of "Associate Professor" in professional field 5.3. Communication and computer technology, scientific field "Technical sciences" at department "Communication Systems and Services" of IICT-BAS to Chief Assistant Svetozar Valeriev Ilchev, PhD.

Sofia,
November 3, 2020

Member of the Scientific panel:

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/ Assoc. Prof. Rumen Andreev, PhD /