REVIEW

by Prof. Rositsa Zhelyazkova Doneva, PhD,

Professor at Plovdiv University "P. Hilendarski"

of the materials submitted for participation in a competition for the taking of

the academic position of "Professor" at Plovdiv University "Paisii Hilendarski"

in the higher education area 5. Technical sciences, professional field 5.3. Communication and computer technology (Automation of areas from the intangible sphere - education, science).

1 .General presentation of the submitted materials

In the competition for the academic position „Professor", announced in State Gazette, issue 92 of 11/18/2022 and on the website of Plovdiv University "Paisii Hilendarski" for the needs of the Department of Electronics, Communications and Information Technology (ECIT) at the Faculty of Physics and technology as the only candidate participates Associate Prof. Dipl. Eng. Dimitar Mihaylov Tokmakov, PhD.

By order No РД-21-329 of 15-th February 2023 of the Rector of Plovdiv University "Paisii Hilendarski" (PU), I was appointed as a member of the Scientific Jury of the competition for taking the academic position 'Professor' at PU in the higher education area 'Technical Sciences', professional 5.3. Communication and computer technology (Automation of areas from the intangible sphere - education, science).

The set of documents for the competition and materials included in it, presented by Assoc. Prof. Dimitar Tokmakov meet the requirements of the Act on the Development of Academic Staff in the Republic of Bulgaria, Regulations on the Implementation of the Development of Academic Staff in the Republic of Bulgaria Act and the relevant Rules of PU.

The participant in the competition presented a total of 33 scientific publications and 12 research projects. Accepted for review are 33 scientific works that are outside the dissertation and are taken into account in the final evaluation, and 12 research projects, of which nine are international, for the participation in which Assoc. prof. Tokmakov was issued a document from the department of scientific research of PU "P. Hilendarski".

The distribution of scientific works by relevant indicators is as follows:

The participant in the competition has submitted 34 publications, of which: 10 on indicator В4 (indexed in Web of Science and Scopus); 10 by indicator Г7 (indexed in Web of Science and

Scopus) and 14 by indicator Г8 (in unreferenced journals with scientific review or in edited collective volumes).

A) 10 on indicator В4 (indexed in Web of Science and Scopus). Two of them have SJR – 0.11. All publications [B4.1- B4.10] are presented in full text.

B) 10 on indicator Г7 (indexed in Web of Science and Scopus). Publications are presented in full text.

C) 13 on indicator Г8 (in unreferenced journals with scientific review or in edited collective volumes). Eight of them are in English and only five are in Bulgarian. All publications in this group are also given in full text.

All publications except one are collective. In most of the articles, Assoc. prof. Tokmakov, PhD is the first or second author, which leaves no doubts about his authorship. The large number of publications with the participation of students and PhD students (11 pcs.) makes an impression.

In the report on compliance with the minimum national requirements for occupying the academic position "professor", Assoc. prof. Tokmakov, PhD presented 46 citations in Web of Science and Scopus of 13 of his scientific works. This far exceeds the minimum national and faculty requirements.

Evidence of the visibility of scientific works is provided - official documents from Scopus and Web of Science.

The extremely good and precise arrangement of the documents and materials submitted for the competition is impressive.

2. Brief biographical data of the applicant

Assoc. prof. Dr. Dimitar Mihaylov Tokmakov was born in 1969 in Plovdiv. In 1994 graduated from the Technical University-Sofia, branch in the city of Plovdiv and received a master's degree with a specialty in "Electronic Engineering and Microelectronics". Since 1996 worked as an assistant professor in the ECIT department, Faculty of Physics and Technology of the Plovdiv University "Paisii Hilendarski" and successively held the academic positions of assistant and chief assistant.

He obtained his PhD in 2011 at the Technical University-Sofia in the scientific field: 5.2 – Electronics, Electrical Engineering and Automation.

In 2013 he holds the position of "associate professor" in the ECIT department, Faculty of Physics and Technology of Plovdiv Univesrity "Paisii Hilendarski" in scientific field 5.3. Communication and computer technology (Automation of areas from the intangible sphere - education, science), which he is currently working on.

I believe that the professional biography of Assoc. prof. Dimitar Mihailov Tokmakov ,PhD fully corresponds to the requirements of the announced competition.

3. General characteristics of the applicant's activity

Assessment of educational and pedagogical activity

Assoc. Prof. Dimitar Tokmakov has presented a report on his classroom and non-auditory employment over the past 6 years, according to which he has conducted lectures and exercises in 5 disciplines: "Computer Networks", "Microprocessor Technology", "Computer Modeling and Engineering Design", "Microprocessor Systems" and 'Programming Microcontrollers in an Arduino Environment'

The candidate has supervised 12 successfully defended graduates at the Faculty of Physics and Technology of the PU. It is clear from the presented materials that Associate Prof. Tokmakov has one PhD student as his sole supervisor. The publication of a large number of articles with the participation of students and PhD students (11 items) speaks of the fact that Prof. Tokmakov works very actively with them and involves them in his research work.

Although he did not present a published university textbook or manual, Assoc. prof. Tokmakov developed and published four electronic courses in the Dipseil e-learning system of the Faculty of Physics and Technology of the PU, for which he presented the relevant evidence.

The published courses are: Project-based e-course "Computer Networks" - 13 topics and a laboratory practicum module on "Computer Networks" - 6 topics; Project-based electronic course: "Microprocessor technology" - 12 topics and a laboratory practicum module on: "Microprocessor technology" - 10 topics; Project-based electronic course: "Computer modeling and simulation of electronic circuits" - 7 topics; Project-based e-course: "Computer modeling and simulation of electronic circuits" - 7 topics.

The analysis of the above gives me reason to place a high assessment on the quality of the educational and pedagogical activities of Assoc. prof. Dimitar Mihailov Tokmakov, PhD.

Evaluation of candidate research activity

Data on participation in a total of 12 research projects (9 international and 3 national) are presented, of which the candidate is the head of three (one international and two national). The sum of the indicators under point E of the table for the minimum national requirements is ,290, with a norm of 150 (almost twice exceeding the criterion).

The high results achieved by him in his research activities are most vividly expressed in his publications. The participant in the competition presented 33 publications, of which: 10 according to indicator B4 (indexed in Web of Science and Scopus); 10 by indicator G7 (indexed in Web of Science and Scopus) and 13 by indicator G8 (in non-refereed peer-reviewed journals or in edited collective volumes).

Prof. Tokmakov is a reviewer of 15 reports and articles in scientific conferences and journals visible in Scopus and Web of Science, of which two articles in ETRI Journal and two articles in Healthcare Technology Letters. His reviews are visible on his public profiles on Publons, Orcid, and Web of Science.

Prof. Tokmakov is the chair of the "Technology and Technologies" section of the Union of Scientists in Bulgaria, Plovdiv branch and a member of the editorial board of the publication "Scientific Works of the Union of Scientists in Bulgaria-Plovdiv"

Contributions (scientific, scientific-applied, applied) and citations

After having familiarized myself in detail with the materials provided, I acknowledge all the scientific, scientific-applied and applied contributions claimed by the candidate in the publications according to criterion B4, which I give in a summary bellow.

Scientific contributions:

1. Innovative circuit solutions are proposed for reducing the energy consumption of wireless sensor nodes with a LoraWan communication interface in low-power mode - "deep sleep" by using a nanotimer and FRAM memory to record the parameters of the LoraWan connection during sleep mode (power off) of the microcontroller and radio transceiver - publications [B4.3] and [B4.6]. Publication [B4.3] receives 12 citations visible in Scopus and Web of Science and 2 citations outside of them as of 2019. Publication [B4.6] receives three citations in Web of Science since 2020.

2. A mathematical model of the energy life cycle of a batteryless wireless sensor node has been developed. Approaches for mathematical calculation of capacitor values are proposed, which are useful in optimizing the time interval of the low-energy state of the sensor node - publication [B4.9] - receives two citations in Scopus and Web of Science.

3. A simulation model of a batteryless sensor node was developed, in the MATLAB environment, with the aim of simulating the dependence of the capacity of the supercapacitor on the magnitude of the current generated by the energy harvester. The developed model is validated through practical measurements of an original proprietary design of a batteryless sensor node, energy converter, supercapacitor and LoraWan interface - publication [B4.9].

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4. A 4-layer heterogeneous network architecture was developed for data collection from heterogeneous sensor nodes - with Zigbee and LoraWan interface - publication [B4.8] - received three citations in Scopus and Web of Science and 3 outside of them.

5. For the heterogeneous cloud layer of the 4-layer heterogeneous network architecture, a WSN server application has been developed that integrates data from the various WSN nodes. - publication [B4.8].

6. 4 circuit solutions for simulating the gain of an operational amplifier without feedback were developed and a methodology was created for their use in the training of students in analog circuit engineering - publication [B4.8] - received 5 citations Scopus and Web of Science and 1 outside of them.

7. A system for non-contact measurement of electric current in the range -/+ 2.2A based on a Fluxgate magnetic sensor has been developed, for which a corresponding software and a calibration algorithm using a calibration equation have been created - publication [B4.4] - gets 8 citations in Scopus and Web of Science and 9 outside them.

8. An electrostatic voltmeter for non-contact measurement of voltage (electric field) from 0-900V was developed and studied. A digital low-pass filter was applied to reduce sensor noise in the range of 0-50V, as well as specialized software for statistical processing - publication [B4.2] - received 3 citations in Scopus and Web of Science and two outside of them.

Scientific and applied contributions

1. The parameters affecting the energy consumed by the wireless LoRaWAN sensor nodes are determined and proven. The research was done on practically implemented sensor nodes and measurements of their parameters - publications [B4.3], [B4.6] and [B4.9].

2. A methodology was created for thermal simulation of electronic equipment and its application in the training of engineering students. The methodology has been validated through practical measurements. Publication [B4.5].

3. An embedded fruit and vegetable image analysis system and software has been created, which can identify areas of interest on the fruit skin and identify spots and decay processes by applying digital filtration and applying RGB-histogram.

4. A methodology has been created for mobile training oriented towards supporting the implementation of tasks and projects (Mobile performance support courseware) and its application in university education and company training of e-business employees - publication [B4.1].

Applied Contributions

1. The developed original circuit solutions of wireless sensor nodes find practical application in various fields of science and technology for collecting and measuring physical quantities, in smart parking sensors, in smart garbage collection, etc.

2. A number of experimental tests were performed to determine the energy parameters of wireless sensor nodes and a device was created to measure their current consumption in a wide dynamic range, see publication [G7.6].

3. An overview of the different types of heterogeneous wireless sensor networks is carried out and the fields of their application are systematized, as well as the aspects of scientific research in this field.

There are 46 citations visible in world-renowned databases of scientific information - Web of Science and Scopus, and most of the citations are for the candidate's scientific works in the field of Internet of Things and Wireless Sensor Nodes.

According to indicator group B, the candidate achieves 239 points with a required minimum of 100. According to indicator group D, the candidate achieves 306.31 points with a required minimum of 200. According to indicator group D, with a minimum required of 100 points, the candidate achieves 460. According to indicator group E, with 150 points required, the candidate scores 290.

I believe that the contributions presented by the candidate and the large number of citations of his scientific publications are fully sufficient for the occupation of the academic position "professor".

4. Evaluation of the candidate's personal contribution

The analysis of the scientific works provided by Assoc. prof. Dimitar Tokmakov, PhD shows that, although there is only one independent publication, in 13 of them he is the first author, and in another 14, he is the second author, which is why I believe that largely his formulated contributions and obtained results are a personal merit. In addition, he is the sole author of the 4 e-courses published by him in the e-learning system Dipseil, which are used for the training of students at the Faculty of Physics and Technology of PU "Paisiy Hilendarski".

Additional confirmation of the authorship of his scientific works is the practical application of some of the formulated scientific contributions - the 4-layer heterogeneous network architecture for data collection from heterogeneous sensor nodes - with Zigbee and LoraWan interface - publication [B4.8] - is used as an architecture for collecting data on environmental and ecosystem parameters in the Joint Monitoring for Environmental Protection in BSB countries project. Project

Number: BSB-884 – funded under the ENI CBC Black Sea Basin Program 2014-2020, in which Assoc. prof. Tokmakov participated as the head of work package T1.

5. Critical remarks and recommendations

I have no significant critical remarks and recommendations on the materials provided to me for this review. I would recommend the applicant to redirect his future scientific publications to scientific journals with Quartile (Q) ranking.

CONCLUSION

The documents and materials presented by Assoc. Prof. Eng. Dimitar Mihaylov Tokmakov, PhD meet all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB and the relevant Regulations of PU "Paisii Hilendarski".

The candidate in the competition has submitted a significant number of scientific works published after the materials used in the occupation of the academic position of "associate professor". In the works of the candidate, there are original contributions that have received international recognition through relevant citations. His theoretical developments have practical applicability, and some of them are directly oriented to academic work. The scientific and teaching qualifications of Associate Professor Dimitar Mihaylov Tokmakov, PhD are unquestionable.

After getting acquainted with the materials and scientific works presented in the competition, analyzing their significance and the scientific, scientific-applied and applied contributions contained in them, I find it reasonable to give my positive assessment and confidently recommend the scientific jury to prepare a report-proposal to The Faculty Council of the Faculty of Physics and Technology to elect Associate Professor Dimitar Mihailov Tokmakov, PhD, Eng., to the academic position of "Professor" at PU "P. Hilendarski" in the higher education area 5. Technical sciences, professional field 5.3. Communication and computer technology (Automation of areas from the intangible sphere - education, science).

13.04.2023 г.   **Reviewer**: ....

(Prof. Rositsa Doneva , PhD)