

OPINION

of Prof. Dr. Anatoly Trifonov Aleksandrov, Technical University of Gabrovo
regarding the materials submitted for participation in the competition
for academic position of "Associate Professor"
in field of higher education – 5. Technical sciences,
professional field - 5.2 Electrical engineering, electronics and automation,
specialty - "Biomedical equipment and technologies"
at the Faculty of Public Health,
Department of Medical Equipment, Electronic and Information Technologies in Healthcare,
Medical University "Prof. Dr. Paraskev Stoyanov" - Varna

In the competition for the academic position of "Associate Professor", announced in the State Gazette, issue 86 from 06.10.2020, Asst. Prof. Dr. Eng. Zhivko Borisov Bliznakov participates as a candidate.

1. Overview of the content and results in the presented works

In the competition for the academic position "Associate Professor" Assistant Professor Dr. Zhivko Borisov Bliznakov participates with 28 scientific papers, from which habilitation thesis - 10 scientific publications (B4.1-B4.10) in publications, referenced and indexed in world-known databases with scientific information (Scopus), 13 scientific publications (G7.1 – G7.13) in publications referenced and indexed in world-known databases with scientific information (Scopus) and 5 scientific publications (G8.1 – G8.5) in non-referred journals with scientific review or in edited collective volumes.

Publications may be classified as follows:

- articles in proceedings of international conferences and symposia abroad - 20 issues [B4.2, B4.5, B4.7, B4.10, G7.2, G7.4 – G7.13, G8.1 – G8.5];
- articles in foreign magazines and journals - 8 issues [B4.1, B4.3, B4.4, B4.6, B4.8, B4.9, G7.1, G7.3].

Five of the works are implemented with one co-author [G7.2, G7.8, G7.12, G8.15, G8.17], and 23 - with two or more co-authors [B4.1 – B4.10, G7.1, G7.3 – G7.7, G7.9 – G7.11, G7.13, G8.14, G8.16, G8.18]. In 8 of the publications the candidate is in first place [G7.1 – G7.5, G7.12, G7.13, G8.8]. All publications are in English.

Eight of the publications are in journals with Impact Factor [B4.1, B4.3, B4.4, B4.6, B4.8, B4.9, G7.1, G7.3], and the total impact factor of the scientific publications of the candidate is 16,549, and 23 publications are referenced in the international database Scopus [B4.1 – B4.10, G7.1 – G7.13].

The candidate meets and in certain indicators exceeds the minimum national requirements. He defended his dissertation in the scientific specialty 02.21.07 "Automated systems for information processing and management (by industry)" on the topic: "Methodology for a global approach and development of an integrated software system for management of medical equipment" (indicator A - 50 points) in 2003. He presents in the competition: habilitation thesis - scientific publications (10 articles) in publications, referenced and indexed in world-famous databases with scientific information (indicator B - 100.96 points); 13 scientific publications in publications, referenced and indexed in world-famous databases with scientific information (Scopus) (indicator G7 - 167.32 points) and 5 scientific publications in non-refereed journals with scientific review or in edited collective volumes (indicator G8 – 36.67 points); 5 citations (indicator D - 50 points). He has participated in 5 national and 18 international research projects, he is the author of 1 university textbook, 1 manual for laboratory exercises and 1 lecture course (indicator E - 26.67 points).

Asst. Prof. Dr. Zhivko Bliznakov has 14 participations in 10 national scientific forums and conferences and 76 participations in 52 international scientific forums and conferences.

2. General characteristics of the candidate's activity

2.1. Educational and pedagogical activity

Dr. Zhivko Bliznakov was appointed as an assistant professor in the Department of Medical Equipment, Electronic and Information Technologies in Healthcare at the Faculty of Public Health of the Medical University of Varna on 10th February 2020. For the academic year 2019/2020 he conducted 140 teaching hours. He presented 3 contracts for teaching as a part-time lecturer at the Technical University of Varna (TU-Varna), total 143.16 hours and 2 certificates for teaching activities from the University of Patras, Greece regarding teaching participation in the disciplines "Clinical Engineering" and "Biomedical Technology" for the period from 2004 to 2011 and "Special topics - IT applications in medicine" for the period from 2009 to 2012. He has conducted lectures in 8 disciplines and exercises in 10 disciplines.

The candidate is an author of a university textbook (Anthropomorphic Phantoms in Image Quality and Patient Dose Optimization: A EUTEMPE network book, IOP Publishing Ltd, 2018), a guide for practical exercises (MPE05: Anthropomorphic Phantoms, Laboratory Exercises - Guide for Learners, European project EUTEMPE-RX, FP7 Fission-2013-5.1.1 (GA: 605298), 2015) and one lecture course book (Aspects of Clinical Engineering - Management of Biomedical Technology, Lecture notes, University of Patras, Greece, 2008).

Asst. Prof. Dr. Zhivko Bliznakov has participated in the establishment of training laboratories and in the creation, reformation and harmonization of curricula in the field of biomedical engineering in Europe. He was a supervisor of 7 graduates who successfully defended their diploma theses.

The above data allow me to evaluate the pedagogical preparation and activity of the candidate as very good.

2.2. Scientific and scientifically-applied activity

The scientific publications (28 articles) submitted for participation in the competition can be divided into three main thematic areas:

Thematic area 1 - Computer models, simulations, algorithms and software applications in X-ray imaging [B4.1- B4.10, G7.1, G7.6, G7.7, G8.1].

Thematic area 2 - Management of medical equipment in healthcare and development of specialized software systems for this purpose [G7.02-G7.5, G7.13, G8.2, G8.3].

Thematic area 3 - Reforming and harmonizing curricula in the field of biomedical engineering in Europe [G7.08-G7.12, G8.04, G8.05].

According to the presented reference for research activity, Dr. Zhivko Bliznakov has participated in 23 national and international research projects, 21 completed and 2 ongoing.

From 2004 to 2016, the candidate led the Department of Biomedical Technology Management, Institute of Biomedical Technology, Patras, Greece. From 2013 to 2019 he was a research associate and part-time lecturer at the Laboratory of Computer Simulations in Medicine, TU-Varna. From 2016 to 2019 he was the head of the Centre for National and International Projects, TU-Varna, and from 2019 to 2020 - Deputy Director of the Centre for Simulation Technologies and Medical Equipment, Medical University of Varna.

The presented data reveal that the applicant has extensive experience in working on projects in the field of biomedical equipment and technologies.

3. Contributions

I accept the formulated contributions in the presented scientific works. They have a scientific, scientifically-applied and applied character and are related to prove using new means of significant new aspects in existing scientific problems and to obtaining confirmation facts in the field of biomedical engineering.

3.1. Contributions from publications equivalent to a habilitation thesis

Scientific contributions

- New algorithms for reconstruction of tomographic images have been developed and have been applied in digital tomosynthesis. Processed tomograms are characterized by reduced

image noise, higher contrast-to-noise ratio and improved contrast characteristics [B4.1, B4.7].

- New physical phantoms of female breasts have been developed for research in the field of X-ray imaging. The approach eliminates the need to segment breast tissue through mimicking the x-ray density of each voxel from the computed tomography image [B4.6, B4.10].

Scientifically-applied contributions

- New materials for the preparation of physical models of the breast for the purposes of radiology have been studied. The X-ray properties of twelve materials used in 3D printing were studied. Based on the obtained results, it is planned to realize a physical model of the mammary gland through the modelling technology [B4.2, B4.8].
- A methodology for creation of realistic three-dimensional software models of carbon-fiber-reinforced polymer structures is provided, intended for use in simulation studies of modern methods for non-destructive testing using X-ray techniques. Two models of carbon-fiber-reinforced polymers have been developed, evaluated and presented [B4.3, B4.4].
- Monte Carlo based software simulators have been developed for research in the fields of X-ray imaging and radiation therapy [B4.6, B4.1].
- New complex computer models of the female breast have been developed by combining mathematical models with real three-dimensional images of patients with tumours. The use of realistic models of the female breast in scientific research allows the simulation of multiple scenarios for modelling and research of imaging diagnostic techniques [B4.7, B4.9].

Applied contributions

- New attractive methods have been developed for conducting innovative training in the field of computer simulations in medicine. An exercise has been developed for the use of three-dimensional printing in the training of biomedical engineers and medical physicists.

3.2. Contributions from publications other than those equivalent to habilitation work

Scientifically-applied contributions

- An integrated software system has been developed for the management of medical equipment in hospitals by the clinical engineering departments. The system model is based on a centralized architecture and offers a global approach to the management needs of the clinical engineering departments [G7.2, G7.3, G8.2].
- Analysis and classification of the medical devices recalled by their manufacturers grouped by categories of devices, cause of malfunction and risk level for the patients, have been accomplished. The analysis shows the growing importance of software in medical devices and identifies the issues that manufacturers need to focus on [G7.4, G7.13].
- A comprehensive review of the current state of biomedical engineering education curricula in European universities has been performed and proposal for their harmonization has been suggested [G7.8 - G7.12, G8.5].

Applied contributions

- An innovative solution has been proposed to increase the effectiveness of conventional technologies used in radiation therapy [G7.1].
- Specialized software systems for the management of medical equipment in the healthcare system of Greece have been developed and implemented - a list of medical equipment installed and used in the healthcare system of Crete Island, software database for identification of registered medical devices in 22 hospitals [G7.5, G8.3].

4. Assessment of the candidate's personal contribution

The citations indicated in the competition documents serve as an assessment of the significance of the contributions. A list of 5 citations in scientific journals, referenced and indexed in world-famous databases with scientific information is presented. In addition to participating in the competition, the candidate has another 51 citations in scientific journals, referenced and indexed in world-famous databases of scientific information (Scopus). The candidate has presented 4 references from prominent scientists, 2 diplomas (from the University of Patras and the National Technical University of Athens - Greece), 1 certificate from the Medical University of Varna and 7 certificates of specialized training in the last five years.

This gives me the grounds to conclude that the candidate in the competition is a well-known author and has published in important scientific forums in the field of the competition. The quantitative indicators have been met, according to the minimum national requirements for holding the academic position of "Associate Professor".

5. Critical remarks and recommendations

I did not find any significant omissions in the works of the candidate. I recommend the summarization of the publications in a monograph book.

6. Personal impressions

I do not know Assistant Professor Eng. Zhivko Bliznakov. I have no common publications with him. I am not a related person within the meaning of paragraph 1, item 5 of the Additional Provisions of the Academic Staff Development Act in the Republic of Bulgaria. My assessment of the candidate's contributions and results in the competition is high.

7. Conclusion:

Given the above, I propose Assistant Professor Dr. Eng. Zhivko Bliznakov to be elected as an "Associate Professor" in higher education field - 5 Technical Sciences, professional field - 5.2 Electrical Engineering, Electronics and Automation, specialty - "Biomedical Engineering and Technology" to Faculty of Public Health, Department of Medical Equipment, Electronic and Information Technologies in Healthcare.

05.02.2021 г.

Member of the jury:


/Prof. A. Aleksandrov/