STANDPOINT

regarding a competition for an academic position „Associated Professor“ in a professional direction 5.2 „Electrical engineering, electronics and automation“, school discipline “Management of electromechanical systems” announced in SN issue 53/ 20.06.2023 with a candidate Assistant Professor PhD Eng. Zhivko Stefkov Zhekov Member of the scientific jury Associated Professor PhD Eng. Mariyana Georgieva Todorova

The candidate in the contest Zhivko Stefkov Zhekov, assistant professor, Ph.D., works in the Department of Automation, Faculty of Informatics and Automatics, TU - Varna. He has been appointed as an assistant at TU-Varna since 2009, and since 2018 is a principal assistant. Zhivko Zhekov's thesis for the award of the science degree PhD is on the doctoral program "Automation of production" and is on the topic "Development of systems for sensorless vector control of asynchronous motors".

1. **General characteristics of the candidate's research and applied scientific activity.**

The general evaluation of the research and scientific-applied activity of assistant professor Zhivko Zhekov can be classified as very good. It is in the field of automation of production, and covers the following directions: adaptive neural sensorless control of induction motor, parameter estimation and control of DC motor variables, etc.

These directions coincide with the professional direction and academic discipline of the announced competition and with the directions of development of the "Automation" department of TU-Varna. This activity is proven by many publications, participation in projects, management of graduates, and that after receiving the educational and scientific degree PhD.

2. **Evaluation of the pedagogical preparation and activity of the candidate.**

Assistant Professor Zhivko Zhekov, PhD, has 14 years of professional experience at TU-Varna. For the period 2020-2023, he gave lectures on 7 disciplines in the "Bachelor's" degree (including the "Management of electromechanical systems" discipline) and 3 disciplines in the "Master's" degree, related to the announced competition. He supervised 19 Bachelor's graduates and 14 Master's graduates. Under his guidance, 4 students and 5 PhD students participate in a project НП-7/2018.

With the personal participation of Zhivko Zhekov, 7 laboratory stands were developed. With the help of the laboratory stands, the training of the students of 2 specialties of the bachelor's College and the master's College is carried out.

Zhekov is the co-author of two teaching aids.

For the period Zhivko Zhekov has one international specialization.

In my opinion, the overall assessment of the candidate for this type of activity is very good. The pedagogical activity of the candidate is directly related to the professional direction of the announced competition.

3. **Basic scientific and scientific-applied contributions.**

The candidate's contributions are scientific, scientific-applied and applied.

The first group of contributions – **scientific contributions**, can be systematized in the following areas:

- An online trained neural controller is proposed, the performance of which has been confirmed when used in vector and sensorless vector control systems of asynchronous motors, and control systems of robots and underwater robots [B 4.4, B 4.5, B 4.6, B 4.7, B 4.9, B 4.10, D 8.11].
- Offline and online trainable neural approximators of the inverse kinematics of robots have been proposed [B 4.6, D 7.2].

The second group – **scientific and applied contributions**, can be systematized in the following areas:

- The possibility of application of the methods for setting the modular and symmetrical optimum of the regulators in a system for subordinate regulation of a two-link planar robot is analyzed [D 7.1].
- The possibility of applying the method of principal components for real-time fault detection of DC motors with unnatural change of their variables and parameters is analyzed [B 4.2].
- Systems for sensorless vector control of an asynchronous motor have been proposed, combining known neural regulators and estimators in a new way [B 4.1, D 8.2].
- Systems for sensorless direct control of the moment of an asynchronous motor have been proposed, characterized by modified iterative estimators [D 8.6, D 8.7].
- Systems using the linearizing feedback method have been proposed for control along a set trajectory of two-jointed robots moving in the horizontal or vertical plane [D 8.4, D 8.5, D 8.9].
- Systems for adaptive control of AC motors are proposed - asynchronous motor and synchronous motor with permanent magnets [D 8.1, D 8.10].
- The applicability of recursive methods for estimating the parameters of DC motors, for the purposes of their adaptive control, by means of self-adjusting regulators is investigated and compared [B 4.3, B 4.8].

The third group - **applied contributions** are:

- A control system for a twin-propeller laboratory model of an aircraft is developed [D 8.3].
- A two-loop DC motor control system based on a TMS320F28335 digital signal controller is developed [D 8.8]
- A two-legged manipulator robot and its control system were developed [D 8.12]
- A two-channel system for coordinated control of a two-motor electric drive, synchronizing the operation of two axes, was modeled and studied [D 8.13]

In my opinion, the contributions are the personal work of the candidate, since he is the first author of some of the publications, and of some of them he is the sole author. Along with the three groups of contributions, there are also methodological contributions related to student learning.

4. Significance of contributions for science and practice.

The candidate's contributions from scientific works are significant and are in the field automation of production. The candidate is known through his publications in Bulgaria and abroad:

- Scientific publications in publications that are referenced and indexed in world-famous databases with scientific information, equivalent to a monographic work - 10 items, 6 of which he is the first author, 3 item independently.
- Scientific publication in publications that are referenced and indexed in world-famous databases with scientific information, not equal to a monographic work - 2 items independently.
- Scientific publications in non-refereed journals with scientific review or in edited collective volumes - 13 nos., 3 nos. of them independently.

Citations of the results of scientific articles on the topic of separation so far in Scopus are 7, and this number does not include self-citations.

During the period 2017 – 2023 Zhivko Zhekov, assistant professor, Ph.D., has participated in 4 research projects, specifically financed by the state budget (of which he is the head of 1) and 2 national projects.

5. 5. Critical notes and recommendations.

The candidate has scientific potential, which is why I recommend preparing publications with an impact factor for his future work.

CONCLUSION

The documents for the competition are very well arranged and formatted. They are accompanied by evidentiary material. For about five years after defending a thesis for the ONS "Doctor", Zhivko Zhekov, assistant professor, Ph.D., Eng., has managed to reach the quantitative indicators of the Regulations for the Development of the Academic Staff of TU-Varna for occupying the Academic position "Associate Professor". The work performed is entirely the responsibility of the applicant. Based on my detailed familiarization with the candidate's materials, I conclude that they fully meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Application of ZRASRB, the Regulations for the Development of the Academic Staff of TU - Varna. My overall assessment of the candidate's scientific works is very high. The candidate has significant scientific, scientific and applied contributions in the field of automation. They are reflected in 25 publications (10 equivalent to a monographic work and 15 outside this group). The candidate has participated in a total of 6 research projects.

Based on the acquaintance with the presented scientific works, their importance, the scientific, scientific-applied and applied contributions contained in them, I find it reasonable to propose Zhivko Stefkov Zhekov to occupy the academic position "Docent" in professio engineering, electronics and automation ", scientific specialty "Automatic

18.10.2023 **MEMBER OF THE**

/Assoc. Prof. PhD Eng. M. Todorova/