

## STATEMENT

**by Assoc. Prof. Dr. Eng. Nikolay Lyuboslavov Hinov, in the academic position of "Associate Professor" at the Technical University - Sofia, in the professional field 5.2. Electrical engineering, electronics and automation**

**of the materials submitted for participation in the competition for holding the academic position "Associate Professor" in the field of higher education - 5. Technical sciences, in the professional field - 5.2. Electrical engineering, electronics and automation, specialty - "Elements and devices of automation and computer technology" (Microprocessor circuit engineering).**

In the competition for associate professor, announced in the Official Gazette, issue 47 from 24.06.2022 and on the website of the Technical University - Gabrovo for the needs of the Department of Electronics at the Faculty of Electrical Engineering and Electronics, as the only candidate involved Assistant Professor Dr. Eng. Valentina Vasileva Rankovska.

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

After the analysis of the scientific works, which Assistant Professor Valentina Rankovska, presents for participation in the competition for the academic position of "Associate Professor" they can be grouped in the following thematic areas:

*- Design of digital and microprocessor devices and systems and application of innovative technologies in engineering education*

The following publications can be referred to in this direction: [1], [2], [4], [5], [7], [8], [9], [12], [13], [14], [22], [23], [24], [25], [27], [28], [29], [30], [31], [32].

The bulk of these works present research that examines the fundamental steps and associated means of designing digital and microprocessor devices and systems from the perspective of improving student learning. Usually, in the training of disciplines studying microcontrollers, development tools of a certain manufacturer are used. An alternative to this approach is the use of development systems with a minimum of peripherals from various manufacturers such as Arduino, Pinguino, Discovery, etc., since embedded systems use typical peripheral blocks, (indications, buttons, keyboards, etc.) it for the expansion of their functional capabilities, it is possible to implement a universal demonstration module that includes the most commonly used peripheral blocks. This approach has been used to intensify practical classes in various academic disciplines.

Another direction of the candidate's research is related to the implementation of open source hardware and software. In some of the works, based on the accumulated experience, it is argued, its successful implementation in various courses for students of electronics, automation, computer science, communications, etc., related to the design of digital circuits, embedded systems, Internet of Things, etc.

A natural development of training is the application of project-based training, the innovative approach (Conceive-design-implement-operate - CDIO) and modern information and communication technologies. In this aspect, projects with different functional capabilities have been developed, which demonstrate the use of microcontrollers in the implementation of the "smart home" concept. On the other hand, in view of the development trends of modern engineering education, various opportunities for self-study and assessment of the students' knowledge have been considered and realized.

*- Intelligent systems for measurements with industrial and household applications and for controlling power electronic devices*

Included in this topic group are publications numbered as follows: [3], [6], [10], [15], [16], [17], [18], [19], [20], [21], [26].

The use of intelligent methods for the management of various objects is based on the collection and processing of information, the measurement of various quantities, the use of communication technologies, etc., and their implementation is carried out through embedded microprocessor systems and programmable logic. The publications on this topic are related to solving several specific tasks in the industry (area measurement in leather processing and labeling machine for automatic labeling on a glass jar), bit (for real-time measurement of active power in a smart home and implementation of energy-efficient electric drives) and for the realization of precise functional generators. Models of various power electronic devices (DC/AC converters) are presented in order to implement microprocessor systems for their management.

- *Application of big data analysis in economics*

In work [11], the candidate's achievements related to the implementation of a system for the analysis of large databases, based on the application of artificial intelligence techniques and mathematical software MATLAB, have found a place. Results obtained from test activities related to cluster analysis, recognition and classification of tasks for the needs of predetermined economic goals and processes are presented. Models with very good quality indicators have been synthesized.

**2. General characteristics of the candidate's activity**

**2.1. Educational and pedagogical activity**

Assistant Professor Dr. Eng. Valentina Rankovska has a long-standing teaching activity in the Department of Electronics of TU-Gabrovo (currently more than 25 years). Conducts classes in 4 disciplines for the Bachelor's degree program and 8 for the Master's degree program. She participated in the development of 3 study plans, author and co-author in the preparation of 12 study programs and built 2 study laboratories on the subject of the competition. In addition, the candidate has submitted 3 textbooks and 1 teaching-methodical manual.

Over the past 5 years, under the guidance of the candidate, 25 graduates from the Bachelor's and Master's Colleges have successfully defended their degrees.

The candidate is also actively involved in the implementation of mobilities under the Erasmus+ program.

**2.2. Scientific and scientific-applied activity**

The candidate has participated in 12 research projects at the UCNIT of TU - Gabrovo, of which he was the head of one of them. In addition, he is a member of the teams of 2 projects financed under various Operational Programs and in a project of the "Scientific Research Fund". The thematic orientation of the contracts with the participation of Valentina Rankovska is related to the application of digital and microprocessor systems in industry, household and also to the improvement of training in this area.

**2.3. Implementation activity**

The candidate has submitted 2 official notes, regarding the implementation and activity related to: the design, realization and implementation of a microprocessor control system for a machine for measuring the area of hides; and of a system for synchronizing the label feed speed of a labeling machine.

The review of the materials submitted for participation in the competition gives me reason to confidently assert that Assistant Professor V. Rankovska has excellent qualifications and very good achievements in the field of digital and microprocessor technology and its application in various spheres of industry and life.

**3. Contributions** (scientific, scientific-applied, applied). **Significance of contributions to science and practice**

I accept a large part of the contributions, formulated by the author on the basis of the publications, for participation in the competition for AD "Associate Professor" - a total of 32 scientific articles and reports. In essence, they are mainly of a scientific-applied nature. They can be summarized as follows:

- Application of innovative technologies in engineering education in the field of design of digital and microprocessor devices and systems based on the use of microcontrollers and programmable logic;

- Development and implementation of intelligent systems for measuring, generating and recognizing signals and for controlling power electronic devices based on microcontrollers and programmable logic.

- Modeling of power electronic converters for the needs of optimal control synthesis;

- Application of artificial intelligence techniques for analysis of large databases in economics.

#### **4. Assessment of the personal contribution of the candidate**

Assistant Professor Dr. V. Rankovska is a long time lecturer and researcher with research related to the topic of the competition. After acquaintance and analysis with his developments and achievements presented in his scientific works, I believe that the candidate has a serious personal contribution and leading participation in them.

#### **5. Critical remarks and recommendations**

My general impression of the materials submitted for participation in the competition is very good. On the other hand, I would like to make the following remarks and recommendations, which generally consist of the following:

- The contributions presented in the author's reference largely reflect the results achieved and it is good that they are specific. In my opinion, they should be summarized and edited in such a way as to better highlight the author's claims and to avoid duplication, as they are essentially quite close to the main areas of activity presented above;

- with the good awareness and degree of mastery of modern software products shown by the author, a natural continuation and confirmation of his research is the performance of modelling and simulation research with the packages ORCAD, PSIM, PLEX, MATLAB / Simulink and others.

- I recommend the candidate to participate in other international scientific conferences in Bulgaria and Europe, as well as to publish in journals with impact factor (IF) and / or impact rank (SJR).

#### **6. Personal impressions**

I know the candidate from his participation in scientific forums in the country. The papers she presented have generated interest and, as a result, sparked discussions in the Electronics and Computer Engineering Guild. The submitted materials for participation in the competition give me reason to claim that Assistant Professor Valentina Rankovska has excellent qualifications and is a well-known specialist in the field of automation and computer technology, specifically in: microprocessor and embedded systems.

#### **7. Conclusion:**

**Having in mind the above, I propose Assistant Professor Dr. Eng. Valentina Vasileva Rankovska to be elected "Associate Professor" in the field of higher education - 5. Technical sciences, professional field - 5.2. Electrical engineering, electronics and automation, speciality - "Elements and devices of automation and computer technology" (Microprocessor circuit engineering).**

27.10.2022

Jury member: /signature/  
/ Assoc. Prof. Dr. Eng. Nikolay Hinov /