OPINION

by Assoc. Prof. Eng. Prodan Ivanov Prodanov, PhD,
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of the materials submitted for participation in a competition for the academic position "Associate Professor" in the Field of Higher Education - 5. Technical sciences, Professional Trend - 5.2. Electrical engineering, Electronics and Automation, scientific subject – "Elements and devices of automation and computer technology" (Microprocessor circuit engineering)

In the competition for associate professor, announced in the Newspaper of State, issue 47/24.06.2022 for the needs of the Technical University of Gabrovo, department of "Electronics", as candidate participate Senior Assistant Professor Engineer Valentina Vasileva Rankovska, PhD.

1. General overview of the submitted materials

The scientific papers presented by Senior Assist. Prof. Valentina Vasileva Rankovska PhD for participation in the current competition can be grouped in the following thematic areas: Design of digital and microprocessor devices and systems and innovative technologies in engineering education related to: means for designing digital and microprocessor devices and systems and the teaching of disciplines related to microcontrollers; means for the design of digital and microprocessor devices and systems and the training of disciplines involving programmable logic; development and research of intelligent measurement and control systems; intelligent systems for measuring, generating and recognizing signals; modeling of industrial objects for the purpose of management; Application of big data in economics. In the competition for the academic position "Associate Professor", Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D., participated with thirty-two (32) scientific works, of which twelve (12) scientific publications were equivalent to a habilitation work. The presented scientific publications can be distinguished as follows: scientific publications in editions that are referenced and indexed in world-renowned scientific information databases (WoS and Scopus): in the Scopus platform – 12 scientific papers [publications 1-12], of which are indexed in the Scopus and WoS platforms – 1 scientific paper [publication 4], published in publications with an impact rank (SJR) – 3 scientific papers [publications 2, 10, 11]; scientific publications non-refereed peer-reviewed journals or in edited collective volumes - 20 scientific papers [publications 13-32]. By place of publication: scientific papers in proceedings of international scientific conferences abroad – 12 scientific papers [publications 4, 12, 15, 18, 19, 20, 25, 26, 28, 30, 31, 32]; articles in Bulgarian scientific journals – 1 scientific paper [publication 22]; scientific papers in proceedings of international scientific conferences in Bulgaria - 15 scientific papers [publications 1, 2, 5, 9, 10, 11, 13, 14, 16, 17, 21, 23, 24, 27, 29]; scientific papers in proceedings of national scientific conferences – 4 scientific papers [publications 3, 6, 7, 8]. 25 scientific papers have been published in English, and 7 scientific papers in Bulgarian. In the competition, the candidate participated with 12 independent scientific papers, and in the rest as a co-author, she took first place in 8 scientific papers.

The candidate in the competition meets and by certain indicators repeatedly exceeds the minimum national requirements. The performance of the indicators by groups according to the national minimum requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria is as follows:

Group of indicators A (at least 50 points) – PhD thesis – 50 points. Inducator 1: The candidate has submitted a diploma for PhD Degree in Professional Trend 5.2. entitled "Development and research of digital one-channel and two-channel systems for generating control and management signals".

Group of indicators B (at least 100 points) - Inducator 4: 12 scientific papers equivalent to a monographic work with thematic area: "Electronic systems for industrial process management" with a total number of ***400 points (min. 100 points are required)*** are presented. The publications are referenced and indexed in the global databases Scopus and WoS. Two of

the publications were published in journals with an impact rank of SJR = 0.189 and SJR = 0.177, respectively.

Group of indicators C (at least 200 points) – Indicator 8: There are presented twenty (20) publications, with a total of 273.33 points. In total for group D, the candidate presents publications with an equivalent number of points ***273.33*** (***min. 200 points are required***).

Group of indicators D (at least 50 points) – Indicator 12: The candidate in the competition has presented 16 citations in refereed publications with the equivalent of ***160 points***; Indicator 14: The candidate in the competition has presented 4 citations in refereed publications with the equivalent of ***8 points***; for this indicator D, the candidate presents a total of ***168 points*** (***a minimum of 50 points is required).***

Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D., also meets the minimum requirements for Technical University-Gabrovo. With a required 20 publications, of which 4 are independent, the candidate submits 32 publications, 12 of which are independent. With a requirement of 5 citations, the candidate present 20, and with a requirement of 2 textbooks and study guides, the candidate has 3 textbooks and 1 study guides. In addition, the candidate also has led one scientific project.

2. General characteristics of the Candidate's performance
2.1. Teaching practice

Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D., is an established teacher at Technical University of Gabrovo with over 25 years of experience as a teacher at the University. According presented reference of the workload at Technical University of Gabrovo, over the last 3 years the Candidate has delivered 1558 hours academic hours to full-time and part-time students. She is a lead lecturer of the following 4 (four) disciplines in the Bachelor Degree: "Microprocessor circuit engineering", "Industrial and automotive interfaces", "Design of circuits in a programmable environment" and "Embedded microprocessor systems", as well as 8 (eight) academic disciplines , included in the curricula for the Master's degree program.

Another aspect of the candidate's educational and pedagogical activity is related to participation in the creation of new curricula for: "Industrial and automotive electronics" specialty in the Bachelor Degree, "Electronics" and "Automotive electronics" specialties in the Master Degree. There are 12 (twelve) study programs developed independently as well as in co-authorship for the above-mentioned study plans in both degrees of study. The candidate is the author of 3 university textbooks and one study guide.

Senior Assist. Prof. Valentina Vasileva Rankovska PhD has participated in the establishment of 2 university laboratories: "Microprocessor Circuit Engineering" and "Circuit Design in a Programmable Environment".

In addition, the candidate supervised a large number students who have successfully defended their diploma theses, and for the period (2018 – 2022) their number is 25.

The above-mentioned data give me reason to assess the candidate's Teaching practice as very good.

2.2. Scientific and scientific-applied activity

The candidate's scientific work can be systematized in the following main thematic areas:

"Design of digital and microprocessor devices and systems and innovative technologies in engineering education" (publications [1], [2], [4], [5], [7], [8], [9], [12], [13], [14], [22], [23], [24], [25], [27], [28], [29], [30], [31], [32]);

"Intelligent measurement and control systems (publications [3], [6], [10], [15], [16], [17], [18], [19] [20], [21], [26]);

"Application of Big Data in Economics" (publication [11]).

According to the presented reference of scientific and research activities, Senior Assist. Prof. Valentina Vasileva Rankovska PhD participated in 12 scientific projects at the University Centre for Research and Technology at TU-Gabrovo, She has lead one of these projects 1 (No. 2002E/2020 "Contactless transmission of information from sensor networks"), and has participated in 11 of them as a member of scientific staff.

Senior Assist. Prof. Valentina Vasileva Rankovska PhD has participated in 3 projects under operational programs: BG051PO001-4.3.04-0051 "Development and implementation of

virtual technologies for sustainable development of distance learning in TU - Gabrovo" under operational program "Development of human resources" - TO 1- 396/11.10.2012 on the position of "Teacher" in expert activity 9.3; BG05M2OP001-1.002-0002-C01 "Digitalization of the economy in a big data environment" under the operational program "Science and education for intelligent growth" 2014-2020, as well as in project BG05M2OP001-1.002-0002 "Building and development of competence centers" , in the position of "Researcher".

2.3. Implementation activities

Senior Assist. Prof. Valentina Vasileva Rankovska PhD has presented has submitted 1 official documents regarding his implementation activities issued by the following company "EU-DEKA-2015" OOD, Stara Zagora.

3. Contributions

3.1. Contributions to publications equivalent to a thesis

I accept the formulated contributions in the presented scientific works. They can be classified as scientific, scientific-applied and applied. They can be summarized as:

Scientific contributions

I. A hybrid approach is proposed for spectral analysis and voice profile recognition using machine learning and artificial intelligence techniques.

II. A microprocessor development system with the possibility of applying microprocessor modules with various mid-range and high-end microcontrollers (with PIC, AVR, ARM and other cores) is proposed and analysed.

III. An advanced software model implemented in a machine vision system designed for arbitrary shape skin surface measurement and automatic color recognition has been developed.

Scientific-applied contributions

IV. The need to apply project-based learning (project-based learning - PBL), as well as the latest trends with the application of the CDIO (Conceive-design-implement-operate) framework, has been analysed and justified.

V. Innovative approaches and practices in teaching and learning embedded systems are analyzed.

VI. Functional capabilities and resources of two types of open-type development boards are analysed: based on microcontrollers and those based on programmable logic with FPGA architecture.

Applied contributions

VII. A flexible web-based monitoring and control educational model has been developed to demonstrate and learn Wi-Fi and Ethernet connectivity.

VIII. Two approaches have been developed to study the nature and mechanism of interrupt handling in microcontrollers.

IX. A synchronization method has been implemented by monitoring the speed of a labelling machine for automatic labelling.

3.2. Contributions in publications outside those, equivalent to a monographic work

Contributions to publications other than those equivalent to a monographic work can be classified as scientific, scientific-applied and applied, referring to the following:

Scientific contributions

I. The main characteristics and parameters of common wireless interfaces, their advantages, limitations and potential areas of application are analysed in the context of the architecture of an embedded system, as well as its applications.

II. The characteristics, resources, advantages and disadvantages of a modern and promising element base in the field of digital and microprocessor circuit engineering - programmable logic with FPGA architecture - have been analysed and systematized.

III. A classification of microprocessor cores for programmable logic with FPGA architecture is proposed, with an analysis of: the advantages of hardware and software processor cores, those with company and user architecture.

Scientific-applied contributions

IV. An automated program training and test system was designed and implemented, applied in the learning process in the discipline "Microprocessor circuit engineering".

V. An approach to mastering the design technology of embedded microprocessor systems using programmable logic and ready-made microprocessor cores is proposed.

VI. Synthesized and investigated models of different types of inverters in phase space useful in the design of microprocessor control systems for industrial applications.

Applied contributions

VII. A WEB-based digital electricity meter has been developed, intended for application in a centralized information system using the Internet as a transmission medium, by means of: radio modems, mobile terminals (GSM), local and global networks.

VIII. A sinusoidal signal synthesizer was designed using the direct digital synthesis method and its tabular description.

4. Assessment of the Candidate's personal contribution

The indicators of the personal contribution in the contributions formulated by the candidate are the participation in the presented publications and citations from the scientific community. In 12 of the presented 32 scientific articles and reports, Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D. is an independent author, and in the remaining 20 publications with which she participated in the competition, she was co-authored by a scientific team, and in 8 of them she was in first place. The content of the competition materials leaves no doubt that the candidate's scientific, scientific-applied and applied contributions are independent or teamwork, but with his significant creative participation.

An assessment of the significance of the author's contributions is the citations indicated in the competition documents. The candidate, Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D. presented a list of a total of 20 citations with which she participated in the current competition. This gives me reason to conclude that she is a well-known author and has published in significant scientific forums in the field of competition. The quantitative indicators have been fulfilled according to the minimum requirements of the Technical University - Gabrovo and the minimum national requirements for occupying the academic position "Associate Professor".

5. Critical notes and recommendations

I did not find any significant deficiencies in the works of the Candidate. I recommend the candidate to expand the scope of his publication activity by publishing his scientific results in journals with IF.

6. Personal impressions

I know the candidate personally and my impressions are based on the submitted documents for participation in the current competition and our common work as colleagues in the Department of Electronics. I don't have any collaborative publications with him. We are not related parties as defined in paragraph 1 (5) of the Supplementary Provisions of the Act on Development of the Academic Staff in the Republic of Bulgaria. The presented scientific production creates an impression of an erudite and precise scientist, with a high level of professional competence. The submitted materials for participation in the competition give me reason to claim that Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D., has excellent qualifications and is a well-known scientist in the field of microprocessor technology.

7. Conclusion:

Taking into account the above mentioned, I propose Senior Assist. Prof. Valentina Vasileva Rankovska, Ph.D. to be awarded the academic position of Associate Professor in the field of higher education – 5. Technical Sciences, professional trend – 5.2. Electrical engineering, Electronics and Automation, scientific subject – "Elements and devices of automation and computer technology" (Microprocessor circuit engineering).

29.10.2022   Member of the scientific jury: /signature/
Gabrovo   /Assoc. Prof. Prodan Ivanov Prodanov, PhD/