REVIEW

Of Professor Engineer Nikolay Dimitrov Madzharov, PhD
occupying academical position "Professor" in professional field
5.2. Electrical engineering, electronics and automation at TU - Gabrovo,

of the materials submitted for participation in the competition for occupation of the academic position "Associate Professor" in the field of higher education - 5. Technical Sciences, by professional field - 5.2. Electrical Engineering, Electronics and Automation, specialty - "Elements and Devices of Automation and Computing Engineering" (Pulse and Digital Devices, Digital Circuitry).

In the competition for associate professor, announced in the Newspaper of State, issue 58/23.07.2019 and on the website of TU-Gabrovo for the needs of the Department of Electronics at the Faculty of Electrical Engineering and Electronics, as candidate participate Senior Assistant Professor Engineer Goran Danailov Goranov from TU - Gabrovo.

1. Brief biographical data

Senior Assistant Professor Engineer Goran Danailov Goranov was born on October 16, 1975 in Vratsa. He graduated from the Technical School of Mechanical and Electrical Engineering - Vratsa in 1994. He studied at the Technical University of Gabrovo from 1994 - 1999, receiving a master's degree specialty - Communication and Technologies. In 2003, after a competition, he was selected as an assistant at the Department of Electronic Engineering and Microelectronics at the Technical University of Gabrovo. In the period 2007 – 2019, he is a Senior Assistant Professor in the Department of Electronics.

His research work began in 2001 as a full-time doctoral student at the Department of Electronic Engineering and Microelectronics at the Technical University of Gabrovo. He defended his doctoral dissertation in 2007 in front the Higher Attestation Commission on the topic "Development and study of control systems for electro technological transistor converters" in the scientific specialty "Elements and Devices of Automation and Computer Engineering".

Senior Assistant Professor engineer Goran D. Goranov, PhD, has 16 years of teaching experience since 2003. During this period, he lectured and conducted laboratory exercises in the disciplines "Digital Circuitry", "Pulse Digital Devices", "Computer Systems and Applications", "Programmable Logic Controllers" for Bachelor's Degree Programs and "Design of Microprocessor Devices" for Master's Degree Programs ".

His professional skills are in the field of PLC programming, CPLD and microcontrollers, construction of automated systems, system administration of servers and workstations, design, implementation and maintenance of computer networks, security systems and video surveillance, development of WEB based applications.

In addition to his in-depth research work, the applicant was the Deputy Head of the Electronics Department in the years 2011 - 2015 and 2018 – 2019. He is a member of the Union of Scientists in Bulgaria.

2. General description of the presented materials

To participate in the competition, the candidate submitted a list of the titles of 47 scientific publications (16 articles and 31 reports), 2 textbooks, 2 manuals for laboratory exercises, a citation reference, lectures on subjects and a list of participation in 10 research projects. On 2 of which he is a manager. Of the peer-reviewed scientific papers 11 are scientific publications in editions of international conferences and journals that are referenced in Scopus and are equivalent to monographs, according to Art. 24, poit 3 by ZRAS RB.

Three of them ([9], [10] are from the ET'2019 International Conference and [11] from HiTech, 2019) are expected to be confirmed in a refereed edition. The remaining 36 articles and reports have

been presented at scientific forums in Bulgaria (25) and abroad (11), which are not referenced in world-renowned databases.

Twenty-four works are written in Latin and 23 in Cyrillic, 6 works alone, 20 with one co-author, 16 with two co-authors; the other 5 have three or more co-authors. The candidate is ranked first in 23 publications and second in 19. There is no scientific work in journals with Impact factor.

Twelve publications with numbers [34], [37 - 47], which have been reported at international conferences abroad, are not included in the National Reference List of Contemporary Bulgarian Scientific Editions with Scientific Review and are not considered in the scoring. But they have the necessary weight because they provide additional information about the applicant's reputation in both the scientific and business fields.

The compliance of the points by the groups of indicators with the minimum requirements for occupation of the academical position Associate Professor in field "Technical Sciences", set out in Art. 2b of the ZRAS RB, is presented in the following table:

GROUP OF INDICATORS	NUMBER OF POINTS ON BASE INDICATORS FROM GROUP		NUMBER OF POINTS OF THE CANDIDATE	MINIMAL NUMBER OF POINTS
A	A1	50	50	50
B	B4	270	270	100
C	C8	262.36	262.36	200
D	D12	60	83	50
	D13	3		
	D14	20		

The summary of this information is as follows:

Group of Indicators A (at least 50 points) – PhD thesis for achieving Educational and Scientific Degree "Doctor"- **50 points**;

Group of Indicators B (at least 100 points) - published monograph or equivalent scientific publications (not less than 10) in editions that have been referenced and indexed in world-renowned scientific information databases - **11** articles and reports of varying numbers authors - **270 points**;

Group of Indicators C (at least 200 points) - scientific publications in non-refereed journals with scientific review or in edited collective volumes - 24 publications with different number of authors - **262.36 points**.

Group of Indicators D (at least 50 points) - citations in scientific publications, referenced and indexed in world-famous databases - **6** citations in refereed scientific publications of 6 scientific publications (60 points), one citation in a monograph with scientific review of one scientific publication (3 points), citations in non-refereed scientific peer-reviewed journals - 10 citations per 10 scientific publications (20 points) - **83 points.**

My general conclusion is that with the submitted scientific publications, citations, published textbooks and participation in a research project, the candidate Sinior Assistant Professor Enginier Goran D. Goranov fully complies with the minimum national requirements for occupying the academic position of "Associate Professor", for the field "Technical Sciences" in higher education, according to Art. 2b of ZRAS RB and the minimum requirements, according to the PPNSZAD in the Technical University of Gabrovo.

3. Reflection of the applicant's scientific publications in the scientific community

To participate in the competition, the candidate submitted a list of 17 citations in scientific publications at home and abroad of 14 of his works. Five of them are in foreign and 12 in Bulgarian editions. From all 11 submitted scientific publications in indexed and world-renowned databases are found two citation in Scopus. One citation is in a monograph, 4 citations are in refereed scientific journals and 10 citations are in non-refereed journals with scientific review.

As a result of the submitted publication activity and the corresponding reflection by citation from other authors, the applicant has a Hirsch index 1 and it can be concluded that he is known to the scientific community in the field of the competition.

4. Review of the content and results of the submitted papers

The scientific works that Senior Assistant Professor Goran Goranov presents for participation in competition for the "Associate Professor" can be summarized in three main areas:

- ***Digital control systems for industrial converters and information processing***

This thematic group covers publications [4], [6], [7], [10], [12], [14], [18], [20], [24], [25], [28], [31], [34], [35], [38], [41-46], the textbook and the manual for laboratory exercises in "Digital circuitry". They are dedicated to algorithms and circuits for controlling industrial converters, in which the regulation and stabilization of the output current and voltage is accomplished by changing the operating frequency. Publications [4] and [14] presents the developed "All-Digital PLL" method and methodology for designing digital PLLs that have been implemented in the CoolRinner2 programmable logic device (XILINX).

Another type of digital frequency synthesis, that the candidate has been developed are presented in [12] and [18]. The Fractional-N method and a generator with a "or" exclusion were investigated. The analysis and optimization of digital PLL used for the control of resonant inverters with energy metering with electrotechnical application, for charging the batteries of electric vehicles with power P = 32 kW [41], [43] and for the development of power supply sources for temperature control and speed setting of motors [35], [20], [24], [38] [42], [44 - 46] is presented.

Developments in the field of digital systems [7], [28], [25], [31] have been used to control the automatic ignition of internal combustion engines and to adjust the generator output voltage at different speeds and loads [34], at study of Peltier element cooling processes, gasoline injectors and control of brushless motors [28].

A Fuzzy Controller-based data processing and management system has been investigated. The system was designed and developed to create new software models applicable to high-power conversion systems and contactless energy transmission systems [7]. Using the MPPT technology, an approach has been applied for optimal operation of the solar panel in a 3kW solar system with a DC / AC synchronous inverter [10];

- ***Computer systems and applications***

This thematic group includes publications [1], [2], [3], [5], [8], [9], [15], [19], [22], [26], [27], [32], [33], [36], [37], [39], [40], [47] and the textbook on Programmable Logic Controllers. Author's research in various programming environments and operating systems is presented. In [1] the problems of information networks are analyzed and a module of defined WEB services for job management in the European grid infrastructure is presented. The considered High-Performance Computing monitoring tools for HPC applications, provide to the end-user metrics for user data collection [2]. A web-based application has been developed to address the issue of the update of VOMS certificates, it is a registry for available virtual organizations and VOMS certificates [22].

Some of the publications in this field are dedicated to WEB based and mobile applications, with the exchange of information via the Internet environment [3, 26, 27, 33, 40]. A web-based sensor network has been developed, which is controlled by a Raspberry Pi microcomputer used to process and store information from sensor nodes. An approach has been proposed to programmatically configure the microcomputer to operate as a WEB server using Apache, MySQL, PHP [3] and a front-end WEB interface with SSL certificate, which solves the problem of monitoring and diagnostics of human health [27]. An innovative sensor - PPG - was used for heart rate monitoring. The system allows 24-hour heart rate recording and automatically alarms for anomalies in its activity [26]. Such WEB based applications have been developed to monitor the parameters of a gasoline generator [34], [39], [40] and to evaluate the qualifications of staff called "360-degree feedback" [5, 19, 33].

The following software applications have been developed and optimized in the next publications [8, 36, 37, 39, 47]: ECG software optimization (Java) by adding new code, higher functionality and adding an algorithm for working with monitors in all ECG resolutions and seals; ABAP-based mobile application software for flight ticketing request [36]; a computer system

enabling the collection, processing and analysis of measured results, which are periodically recorded by the LPT parallel port in a MySQL relational database [37]. The results obtained are in a form suitable for presentation in the WEB application; a new digital circuit model for HDB3 precoder in NRZ code [19], and an approach has been developed for modeling a bipolar two-collector magnetotransistor in two variants - in schematic and text format [47].

Developments using surveillance cameras and thermal imaging cameras are presented in [9, 15]. A method for contactless and non-invasive examination and monitoring of the wear of a cutting disc for elastic abrasive cutting is proposed by applying the methods of infrared thermography and planned experiments. System for remote control and video surveillance of bioreactor based on IP camera and programmable logic controller;

- *Intelligent microprocessor measuring systems*

Scientific publications [11], [13], [16], [17], [21], [23], [29], [30] present developments on intelligent microprocessor systems for measuring magnetic field strength by means of Hall, magnetoresistors, magnetodiodes, magnetotransistors and magnetic-sensitive integrated circuits. It has been proposed to develop a galvanic magnetic device by means of a Hall element and a microcontroller with a five-channel measurement of the magnetic field and current respectively [13, 16, 29, 30]. For visualization, a microprocessor system with adjacent program code is used to ensure that the specified algorithm is executed. Additionally, papers [11, 17] presented the developed electronic systems based on the AT mega-128 and PIC16F877 microcontroller for the study of the parameters of galvanic magnetic sensors and the program code providing functionality and automated calculation of the h-parameters.

Paper [21] presented the development of an electronic level based on a specialized magnetic sensor accelerometer ADXL335 and a microcontroller, type PIC16F877, which processes the information from the sensor and controls information indication. Another measuring system for the consumption of water or other liquid has been developed through the same hardware and Hall sensor [23].

Another direction in the field of intelligent microprocessor systems is the use of a programmable logic device - FPGA in the design of digital circuits for the management of industrial converters and the collection, measurement and processing of information [16].

5. General characteristics of the applicant's activities
5.1. Educational and pedagogical activity

The candidate for academic position "Assoc. Prof." Sinior Assistant Engineer Goran Goranov has a 16-year teaching career at the Electronics Department of TU-Gabrovo. He is the holder of 4 courses for Bachelor's Degree Programs and one Master's degree for full-time and part-time education. For the competition he participated with 2 textbooks and 2 teaching manuals, all of which were peer-reviewed. The language and style of the author in them is accurate and clear.

For the past three years, under the leadership of the candidate have successfully defended 7 Bachelor's Degree and 13 Master's Degree. He has been a reviewer of 21 diploma papers, 2 papers of the ET'19 international conference and 10 UNITEC 2017 papers.

Senior Assistant Professor Goranov has prepared curricula for the subjects Programmable Logic Controllers, Digital Circuitry, Computer Systems and Applications, Impulse and Digital Devices, Design of Microprocessor Devices, and Impulse and Digital Devices in Communications. Under his direction, a training laboratory for the design of microprocessor devices was established in the territory of the department of Electronics.

The candidate has good language skills. He is fluent in English and Russian languages on a basic and independent level, which allows him to maintain useful contacts and exchange of information with colleagues from abroad working in his scientific field.

5.2. Scientific and applied scientific activity

The applicant's scientific and applied activity is related to his participation in 7 research projects at the UCSRT of the Technical University of Gabrovo, on one of them he was a leader. He is a participant in one project funded under the Operational Program "Science and Education for Smart Growth" and in one project under the "Research Fund". In 2014 he was the head of a contract "Design and manufacture of an autonomous control system based on PLC for ignition of a gasoline engine", with the contractor "STD Group" Ltd., Gabrovo.

The thematic focus of the projects in which the applicant participated can be summarized in the following technical areas: digital systems for industrial converter control and information processing; computer systems and applications; intelligent microprocessor measuring systems.

5.3. Implementation activities

The applicant has submitted 4 official notes proving his implementation activity as follows:

- STD GROUP, Ltd. - design and manufacture of autonomous control system based on PLC for ignition of gasoline generator - 2014;

- Leader Trading Company, Ltd. - implementation of microprocessor control system for skin area measuring machine - 2018;

- Municipality of Dryanovo - design and manufacture of sound system and optimization of its operation through sound processor - 2017;

- DCC Sevlievo Medica, Ltd. - development of a WEB based system for planning the employment of physicians when enrolling patients - 2019.

The active implementation activities presented here give me a reason to claim that Senior Assistant Professor G. Goranov has excellent qualifications and is a well-known specialist in the field of microprocessor systems and their application.

6. Contributions

I accept the contributions formulated by the author on the publications with which he has participated in the Assosiate Professor Contest - total of 47 scientific articles and reports. They are essentially scientificly applied and consist of appliying the developed analytical apparatus and obtaining of confirmatory facts in the development and research of new and existing electronic products. They can be summarized as follows:

Scientific-applied contributions to the works in the thematic field "digital systems for control of industrial converters and information processing"
- The digital method "All-Digital PLL" was developed based on the synthesis of combination schemes [4,14], [textbook on "Digital circuits"], generators controlled by digital code [12, 18, 43] and the corresponding methodology for Designing [14] of a control system for transistor resonant converters.
- A cycle-by-cycle method and a digital, step-by-step PWM for the control of a thermostat have been synthesized, by applying a temperature feedback, thereby reducing losses in the heating element and increasing the heat factor. [35], [Digital Circuits Textbook].

Applied contributions to the works in the thematic area "digital systems for control of industrial converters and information processing"
- An algorithm for PWM control of a three-phase electric motor based on CPLD has been developed, built as a "fuel pump" in a gas injection bottle operating in liquid phase. An innovative method with constant values for controlling the brushless motor is applied. The process of controlling a three-phase electric motor by mathematical analysis in MATLAB medium is justified [22,24].
- Based on the CPLD matrix, digital modules for dual-line matrix display control and I2C communication driver, as well as EEPROM read / write, have been developed. Digital synthesis of a new model logic circuit for precoder from HDB3 in NRZ code has been made [19, 38,44, 45].

- Innovative systems for process control and monitoring [textbook on Siemens Programmable Logic Controllers - S5, S7] based on different types of cameras and microcontrollers (ATmega 128, Fuzzy Controller) have been synthesized and researched: to determine the quality and area of raw materials in leather industry [6]; for the management of the battery charge for the solar system by using predefined analytical dependencies in order to achieve maximum technical and operational parameters [10]; for data processing and control for the purpose of creating new software models applicable to high-power conversion systems, energy transfer systems [7], in Peltier cooling systems, to brushless motor control modules [25,28,31].

Scientific and applied contributions to the works in the topic area "Computer systems and applications"

- The architecture of WEB modules for job management and performance monitoring of HPC applications based on the g-Lite midleware has been developed. A registry for available virtual organizations on the European Grid Infrastructure (EGI) and VOMS certificates with advanced functionality has been developed [1, 2, 22]. Twice the KNL processor performance has been achieved compared to the Ivy Bridge-EP processor in the calculation of complex physical processes [5].
- An algorithm for the application of IP cameras for remote visual inspection and real-time measurement of technological parameters in biofuel production has been synthesized [15].
- Software applications have been developed for mobile (ABAP-based) and computer devices embedded in a business system for automatically generating database-derived information [36], [a textbook on Siemens Programmable Logic Controllers - S7, and for processing of information from a personal computer using an ADC and logic matrix XC2C256 [46].
- A model of two-collector magnetotransistor compatible with PSpice-based computer simulators has been developed [47].

Applied Contributions to Papers in the Thematic Area "Computer Systems and Applications"

- A sensor network with a WEB interface and an approach for programmatic configuration of the microcomputer with application in medicine, energy, measurement systems and management of companies for evaluating the quality of staff have been implemented [3, 26, 27, 33, 37,39,40].
- Software applications have been developed to work with monitors at all resolutions, print data from various medical examinations [8, 32] and infrared thermography for wear disc cutting studies [9].

Applied Contributions to the Works in the Thematic field "Intelligent Microprocessor Measuring Systems"

- Specialized microprocessor measuring systems have been developed to study the magnetic field strength [13, 29, 30] and the parameters of galvanic magnetic sensors [11, 17]. A prototype two-collector magnetotransistor, an electronic leveler and an electronic water meter have been investigated [21, 23].
- An algorithm for the design of electronic components and circuits in the Spartan-3E development environment of Xilinx has been synthesized [16].

In general, the results obtained are complete and are suitable for use in both scientific and applied work and in the educational process. The formulated scientific and applied contributions are the personal work of the applicant and show that the work done by him as a lecturer and researcher is largely innovative and fully complies with the requirements for the competition for the academic position of Associate Professor.

7. Assessment of the applicant's personal contribution.

On the topics presented in the papers for participation in the competition, Senior Assistant Professor Goran D. Goranov has been working since his entry into the Department of Electronics in 2003. I am familiar with his developments and considering his good theoretical background and engineering and computer skills, I believe that the presented materials are personal developments or with his leading participation.

8. Critical notes and recommendations

1. The information on scientific works in the relevant lists is not complete: for participation in the competition - [9], [11], [41-43] and for citations - [8], [10], [15], [17].

2. In the formulation of contributions, the scientific and applied field in both textbooks is not considered.

3. It is appropriate to separate contributions from publications equivalent to monograph work and other publications.

These notes do not decry the good presentation of Senior Assistant Professor G. Goranov at the competition for occupying the academic position "Associate Professor".

9. Personal impressions

I know the candidate as a student and then as a lecturer in the Electronics department of the Technical University of Gabrovo and a member of the team of Prof. A. Alexandrov. I am well aware of all the developments and research presented in the field of Web based systems and digital and microprocessor technology. On this basis, in the period 2012 - 2016 publishes textbooks and related manuals on "Digital Circuitry" and "Programmable Logic Controllers" in which it presents the principle, device, characteristics, parameters and applications of impulse and digital devices. He is an active participant in the construction of the material and technical base of the Department of Electronics. At his initiative in 2015 a training laboratory on "Designing microprocessor devices" was established, sponsored by "Jonson control" and "Sqilline". He is also responsible for being an active participant in candidate student campanies for the Electronics department.

Since 2007. Applicant is a Leading Lecturer in Digital Circuits, Impulse and Digital Devices, Programmable Logic Controllers, Computer Systems and Applications for Bachelor's Degree Programs and Design of Microprocessor Devices for Master's Degree Programs.

10. CONCLUSION:

Taking in account the foregoing, I propose Senior Assistant Professor Eng. Goran Danailov Goranov to be elected for Associate Professor in the field of higher education - 5. Technical sciences, by professional field - 5.2. Electrical Engineering, Electronics and Automation, Specialty - Elements and Devices of Automation and Computing Engineering (Impulse and Digital Devices, Digital Circuitry)

05.12.2019 г.   Reviewer: /signature/

/Prof. Nikolay Dimitrov Madjarov, Ph.D. /