

## **R E V I E W**

### **From Prof. Stanimir Mihaylov Sadinov, PhD**

from the Department of "Communication Equipment and Technologies" from Technical University of Gabrovo

of the materials submitted for participation in a competition for the academic position of "Associate professor" in the field of higher education - 5. Technical sciences by professional field – 5.3. Communication and computer technology, specialty - "Communication networks and systems" (Communication and computer systems, Measurements in communications)

In the competition for associate professor, announced in the State Gazette, no. 54/25.06.2024 and on the website of TU-Gabrovo for the needs of the "Communication Techniques and Technologies" Department at the "Electrical Engineering and Electronics" Faculty (FEE), as the only candidate participated Ch. Assist. Prof. Georgi Ivanov Georgiev, PhD, from the department of CET, FEE of the Technical University-Gabrovo

#### **1. Brief biographical data**

The candidate Ch. Assist. Prof. Georgi Georgiev, PhD, graduated with a bachelor's degree in "Automation, information and control technology" at the Technical University - Gabrovo in 2007, and in 2008, a master's degree with a specialty in "Occupational Safety". His working career began as a teacher at the "Fundamentals of Electrical Engineering and Power Engineering" department as an "assistant" and "senior assistant" in the period 2009 to 2017. In the academic year 2017/2018, he worked as a teacher in the Professional Technical High School "D-r. Nikola Vasiliadi" in the town of Gabrovo. Obtained an educational and scientific degree (ONS) "Doctor" in the doctoral program "Theoretical foundations of communication technology" with a dissertation on the topic "Statistical methods for identification and forecasting of parameters of traffic flows in teletraffic systems" at the "University of Ruse - Angel Kanchev". From November 2019, after a competition, he was appointed to the position of "chief assistant" to the staff of the "Communication Techniques and Technologies" department, continuing to perform his pedagogical and scientific work in the same department.

The candidate has advanced practical and theoretical knowledge in areas such as developing systems and applications for: Extracting knowledge from data through the methods and algorithms of Artificial Intelligence, Machine Learning, Mathematical and Applied Statistics; Monitoring and administration of traffic in specialized telecommunication systems; Digital signal processing; modeling Biometric systems with access control based on facial recognition, voice analysis, as well as communication infrastructures, when operating with information clusters from Big Data and others, acquired during his studies and during his teaching practice.

As a university lecturer, the candidate has a very good knowledge of English and based on this, he has conducted 10 mobilities under the Erasmus + program for the purpose of teaching, training and operational activities abroad. His co-authored reports

have been awarded 5 times in international conferences in the country, and he is currently the author and co-author of 93 scientific publications in international and national conferences and magazines in the country and abroad. He is a member of the "Union of Electronics, Electrical Engineering and Communications - CEES".

## **2. General description of the presented materials**

In connection with the competition for the occupation of the academic position "associate professor", Ch. Assist. Prof. Georgi Georgiev, PhD, has presented a total of 39 scientific works - 36 publications and 3 textbooks and teaching aids, which should be categorized as follows:

- Group of indicators „B.4“: 10 scientific publications in journals that are referenced and indexed in world-renowned databases with scientific information, all of which are co-authored and bring him a total of 217 p.;
- Group of indicators „Г.7“: 14 scientific publications in journals that are referenced and indexed in world-renowned databases with scientific information, all of which are co-authored and bring him a total of 162.65 p.;
- Group of indicators „Г.8“: 12 scientific publications in non-refereed peer-reviewed journals or in edited collective volumes, 4 of which are independent and the rest co-authored and bring him a total of 140.02 points;
- Group of indicators „Д“: has presented 15 citations in scientific publications, referenced and indexed in world-famous databases with scientific information, which brings him 150 p.;
- Group of indicators „E“: has presented participations in 4 national scientific projects and one project of which he was the leader. In co-authorship, one university textbook and two teaching aids are given. There are 5 awarded by national scientific forums and organizations, making a total of 110 p.

In this way, the candidate significantly exceeds the minimum requirements of the Law on the Development of the Academic Staff and the Regulations for the Acquisition of Academic Positions and Scientific Degrees of TU - Gabrovo, for occupying the academic position of "Associate Professor", by presenting in his documents 4 independent publications, one publication with IF(WoS) and 12 publications with SJR(Scopus). Thus, the total number of points per Ch. Assist. Prof. Georgi Georgiev, PhD is 829.67 points, with a requirement of 400 points.

In short, the publications can be reflected in the following order:

- scientific publications with an Impact factor WoS – 1 (Г.7.1);
- scientific works with Impact rank SJR – (B.4.1, B.4.4, B.4.7, B.4.9, B.4.10, Г.7.1, Г.7.4, Г.7.6, Г.7.8, Г.7.13, Г.7.14);
- scientific works in Bulgarian – 6 (Г.8.3, Г.8.6, Г.8.9, Г.8.10, Г.8.11, Г.8.12);
- scientific publications in English - 30 (B.4.1 – B.4.10, Г.7.1 – Г.7.14, Г.8.1, Г.8.2, Г.8.4, Г.8.5, Г.8.7, Г.8.8);
- independent scientific publications – 4 (Г.8.9, Г.8.10, Г.8.11, Г.8.12);
- co-authorship in scientific works: 2 co-author – 7 (B.4.4, B.4.5, B.4.6, B.4.10, Г.7.3, Г.8.5, Г.8.6); 3 co-author – 13 (B.4.1, B.4.3, Г.7.2, Г.7.4, Г.7.6, Г.7.7, Г.7.10, Г.8.1, Г.8.2, Г.8.3, Г.8.4, Г.8.7, Г.8.8); 4 co-author – 9

(B.4.2, B.4.7, B.4.8, Г.7.1, Г.7.5, Г.7.8, Г.7.9, Г.7.11, Г.7.12) and 5 co-author – 3 (B.4.9, Г.7.13, Г.7.14).

### **3. Reflection of the candidate's scientific publications in the scientific community (known citations)**

The candidate has submitted information on 15 citations in scientific publications, which are referenced and indexed in the world-famous databases Scopus, IEEE - indicator "Д.12" with the equivalent of 150 points with a required minimum of 50 points, of which 7 were made by authors from the country and 8 by foreign authors. According to a current reference in Scopus, Ch. Assist. Prof. Georgi Georgiev, PhD participated as a co-author in a total of 38 scientific papers with 61 citations in 55 scientific papers with the metric h-index = 5. According to the latest data in Google Scholar from 2019, the candidate has reflected 132 citations in the last 5 years and h-index = 6. These facts give me reason to conclude that the achievements of his scientific research activity have become widely available to the scientific community in the country and abroad.

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

The research papers submitted to me for review can be categorized into the following subject areas, which are covered in the individual publications:

- I. Subject area: Monitoring and optimization of performance indices of the transmission environment, the service of packets with different organization and prioritization in network traffic in information - communication systems and infrastructures and Internet environment with the implementation of the concepts of Artificial Intelligence and Machine Learning. The following publications fall within the scope of the indicated thematic direction: B.4.10; Г.7.1; Г.7.2; Г.7.3; Г.7.4; Г.7.5; Г.7.11; Г.7.12; Г.7.13; Г.8.2; Г.8.3; Г.8.4; Г.8.5; Г.8.7 и Г.8.9;
- II. Subject area: Monitoring of disturbances and noises in the transmission environment while ensuring the quality of service and integrity of data during transmission in the communication channels, tones and speech signals in modules and systems for voice analysis and diagnostics using analytical tools, methods and algorithms of Machine Learning. In relation to the indicated thematic area, research has been carried out in the following publications: B.4.2; B.4.3; B.4.6; B.4.8; Г.7.7; Г.7.8; Г.7.9; Г.7.10; Г.7.14; Г.8.1; Г.8.8; Г.8.10; Г.8.11 и Г.8.12;
- III. Subject area: Monitoring of physical access and security to information resources through voice analysis and management, pattern recognition in access control systems and computer vision units with adaptation of analytical approaches for digital processing and integration of Artificial Intelligence and Machine Learning. In connection with the indicated thematic direction, the following publications are included: B.4.1; B.4.4; B.4.5; B.4.7; B.4.9 и Г.8.6.

All works submitted for participation in the competition for the acquisition of the Academic position of "associate professor" correspond to the subject of the competition and are accepted for review.

## **5. General characteristics of the applicant's activity**

### **5.1. Educational and pedagogical activity**

Ch. Assist. Prof. Georgi Georgiev, PhD has a very active educational and pedagogical activity. He has developed curricula and is a leading teacher in the disciplines for which the competition was announced: "Communication and computer systems" and "Measurements in communications" for students in the second and third year of the specialty "Communication technologies and cyber security - CTCS" studying in an educational and qualification degree "Bachelor". In the master's degree, he teaches lecture courses on the disciplines "Information protection systems", "WEB - based access control systems" and "Communications project management" for students of "Communication engineering and technologies" and "CTCS" majors. He teaches seminars and laboratory exercises on "Communication and computer systems", "Databases and cyber protection", "Measurements in communications", "Telecommunication networks and protocols" and "Application of artificial intelligence in communications" to students from II, III and IV courses for the "CTCS" specialty. Actively participates in research activities in teams with students and doctoral students in the Department of "Communication Techniques and Technologies". In the period 2019 - 2024, he was the thesis supervisor of more than 25 successfully graduated engineers in the specialties "CTT", "CTCS", "Digital Administration" and "Industrial Management" in "Bachelor" and "Master" degrees. Under his leadership, reports of students and doctoral students were developed in the "Student Scientific Session" at TU - Gabrovo. The candidate is a co-author in the development of one textbook "Multiplex Optical Systems and Networks" and two teaching aids "Modeling and Analysis of Teletraffic Processes in Communications" and "Guide to Telecommunication Transmission Lines and Optical Communications", which are used to support the teaching activity of main subjects studied in the curricula of CTT and CTCS specialties. In his educational and pedagogical activity, Dr. Georgi Georgiev uses various specialized software products for simulation modeling, software development and documentation. Has competence in working with MSSQL, MySQL databases; programming languages HTML, PHP, CSS, Java Script, C and C++. Operation with software products LabVIEW, MATLAB, STATISTICA, Cisco Packet Tracer, Altium Designer and others. His main interests are related to tasks for statistical diagnosis, optimization, classification and predictive analysis in the field of technology and digitization with the application of Artificial Intelligence and Machine Learning in the educational and pedagogical activity with students.

### **5.2. Scientific and scientific-applied activity**

The research and publication activity of Ch. Assist. Prof. Georgi Georgiev, PhD includes 36 publications and 3 textbooks and teaching aids, covering a wide range of international forums in the country and abroad. Among the more significant of them are "BIA - Biomedical Innovations and Applications", "EEPES - Electronics,

Engineering Physics and Earth Science", "CIEES - Communications, Information, Electronic and Energy Systems", "TELECOM", "ET - Electronics", "EAEIE - Education in Electrical and Information Engineering". The international specialized publications "Journal of Electrical Engineering", "Journal of Engineering Science and Technology Review", "MDPI Engineering Proceedings" can also be mentioned here. The directions of the candidate's scientific and scientific-applied activities concern the technologies of "Machine Learning" and "Artificial Intelligence", integrated in the development of approaches, methodologies and applications in the regulated scientific spheres "monitoring of the transmission environment in communications", "tracking and control of communication channel interference," and "biometric voice diagnostics and facial recognition in hierarchical access administration." The indicated spheres are widely affected in the studies, according to Ch. Assist. Prof. Georgi Georgiev, PhD presented information on participation in internal projects at the university level, implemented at the Faculty of Electrical Engineering and Electronics:

- № 2305E / 15.03.2023 „Development of ICT-based systems for the study and monitoring of traffic and user access with Artificial Intelligence“;
- № 2208E / 22.03.2022 "Synthesis of intelligent object recognition systems in information and communication structures“;
- № 2105E / 22.03.2021 "Synthesis and study of models for recognition of speech, images and biometric information, evaluation and optimization in the transmission of teletraffic data in information and communication systems“;
- № 20075E / 16.03.2020 "Information Processing, Basic Process Research and Security Enhancement in Communication Systems“.

The candidate was a participant in an external project for TU - Gabrovo "Digitalization of the Economy in a Big Data Environment", financed under the Operational Program "Science and Education for Smart Growth". The project was implemented within the framework of a partnership between "University of National and World Economy - Sofia", "University of Economics - Varna", "TU - Gabrovo", "Paisiy Hilendarski University of Plovdiv", "Angel Kanchev University of Ruse" and "Bulgarian Academy of Sciences - Institute of Information and Communication Technologies".

### **5.3. Implementation activity**

The submitted materials for participation in the competition lack documentary data confirming created patents, utility models, inventions and others. As an innovative activity, the candidate's work on the project "Digitalization of the Economy in a Big Data Environment" can be highlighted, where prototypes of analytical tools based on "Artificial Intelligence" and "Machine Learning" with resource-distributed processing and manipulations were created aimed at clustering, classification and forecasting tasks regarding indices of main business functions in different economic directions for companies from Gabrovo and the region.

The candidate participated in the teams of 4 university projects, which ended with the development and implementation of modules and technologies in the educational

process of the KTT department, laboratory installations and software applications for research and analysis of communication networks and systems.

## **6. Contributions (scientific, scientific-applied, applied)**

Analyzing the materials submitted for participation in the competition, I accept and classify the candidate's contributions as follows:

➤ *Scientific contributions:*

- Development of approaches for regression diagnostics and derivation of models for predictive analysis regarding performance indices of the transmission environment in simulation modeling of ICT infrastructures based on a Full factorial experiment, Planning of the experiment and application of subsequent analytical tools belonging to Applied Statistics, Artificial Intelligence and Heuristic Methods;
- Compilation of a methodology for the integration of conventional and non-conventional methods and algorithms for non-linear optimization in the search for extremum and analytical diagnostics of data clusters in connection with inferred regression models for the predictive analysis of performance indices of the transmission medium and disturbances in the communication channels for connection of ICT infrastructures.

➤ *Scientific and applied contributions:*

- Creating approaches for diagnosing the behavior of performance indices of the transmission medium to ensure optimality and improve the efficiency of packet transmission using modeled FFNN, GRNN, CFNN, ANFIS analytical methods;
- Development of approaches for monitoring broadband access to services and the load of network routes in active urban environments by training and selecting FFNN, PNN, k-NN, DT tools;
- Compilation of hybrid approaches for the identification of spectrally processed tones in different frequency bands and at varying RMS noise values, customized, specific speech profiles through the integration of multilayer FFNNs, ANFIS, DA, NB, k-NN, DT analytical tools;
- Synthesize approaches for spectral analysis and identification of interference, analog and digital signals with the added impact of noise in communication channels in the course of derivation and selection of DA, FFNN, k-NN, NB, SVM, ANFIS models for identification of specific output groups;
- Development of approaches for voice analysis, image processing for extraction and selection of specific features and subsequent recognition of personalized profiles with the inclusion of Fast Fourier Transform and Discrete Wavelet Transform in user access authentication and verification systems;
- Synthesis of a methodology for implementing the principles of deep learning in the creation and verification of FFNNs, PNNs, ANFIS, k-NN with Deep Learning Principles in the analysis of user voice profiles and

facial image recognition in systems for physical access administration and access cyber security to information resources.

➤ *Applied Contributions:*

- Synthesizing Neural Models for Voice Diagnostics, User Authentication, and Voice Control of Electronic Appliances and Devices in Smart Home Systems;
- Adaptation of linear neural architectures in terms of reducing the impact of noise and perceived interference when transmitting analog and digital signals in communication link channels;
- Design of interactive GUIs with remote control via WEB environment for modeling and diagnosing the characteristics and tuning performance of recursive and non-recursive filters used in communications and electronics.

I evaluate the applicant's contributions as:

- Enriching knowledge and systems by formulating innovative approaches in existing scientific fields;
- Creation of modified algorithms and methods for obtaining confirmatory facts.

## **7. Evaluation of the candidate's personal contribution**

Of the 39 scientific works accepted for review (36 publications and 3 textbooks and teaching aids), 4 publications are independent, and in 12 publications Ch. Assist. Prof. Georgi Georgiev, PhD, is the second author. For the rest of the publications, I have not been presented with a separate protocol for the percentage participation of the authors, which is why I accept their participation as equal. This, as well as the analysis of the scientific works submitted for review, give me reason to believe that the contributions presented in point 6 of my review are the work of the candidate.

With all this, the candidate proves that he can set and solve scientific tasks on his own at the level of a trained scientist, knows the tools and knows how to apply them.

## **8. Critical remarks and recommendations**

Based on an analysis of the works submitted to me for review for participation in the competition, I make the following remarks and recommendations for the future work of Ch. Assist. Prof. Georgi Georgiev, PhD:

- To have greater independence in his scientific and publication activity, it is not good for the submitted publications in the competition, for the lead author to be another colleague;
- To approach his teaching work responsibly and create interesting teaching materials and constantly update their content;
- To focus his research activity in a narrower scientific field and to clarify in the expression and in the definition of specific concepts generally known facts, striving not to make stylistic errors, as well as to have greater clarity and order in his publication work;
- To continue its active work with students, PhD students and young scientists, with the aim of creating a team with capacity, implying obtaining

more significant results and participation in national and international research projects and programs.

### **9. Personal impressions**

I know the candidate for participation in the competition Ch. Assist. Prof. Georgi Georgiev, PhD for more than 13 years. Fate has decided that I will be a "determining factor" in his life, because I was a reviewer of his PhD dissertation work. I believe that he has pedagogical skills and competences, as well as organization, self-discipline and teamwork skills. Continuously demonstrates a desire for personal improvement and acquisition of new knowledge and skills. I think that all colleagues from the department share positive feedback about him, about his teaching and research work. This gives me reason to believe that I have formed an adequate and objective opinion about the candidate and his overall work.

I believe that the quantity, quality of the scientific production, as well as the professional implementation of Ch. Assist. Prof. Georgi Georgiev, PhD, comply with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Application and the requirements of the Technical University - Gabrovo for occupying the academic position "Associate Professor".

### **10. Conclusion:**

The materials offered for my review for participation in the competition are sufficient in volume and content. Quantitatively, the materials presented to me significantly exceed the minimum scientometric requirements for the academic position of Associate Professor. The analysis of the scientific production for participation in the competition shows that Ch. Assist. Prof. Georgi Ivanov Georgiev, PhD, has carried out sufficient and significant teaching and research work. He has published articles, reports and textbooks. The candidate's scientific output has the necessary scientific-applied and applied contributions. By comprehensively assessing the results obtained from the candidate's activity, I consider that they meet the requirements for awarding the academic position "Associate Professor".

**Bearing in mind the above, I propose Ch. Assist. Prof. Georgi Ivanov Georgiev, PhD to be elected as "Associate Professor" in the field of higher education 5. "Technical sciences", professional field 5.3. "Communication and computer engineering", specialty "Communication networks and systems" (Communication and computer systems, Measurements in communications)**

04.10.2024  
Gabrovo

Reviewer:                    /signature/  
                                      /Prof. Stanimir Sadinov, PhD/