O P I N I O N

by Assoc. Prof. Boyan Dimitrov Karapenev, PhD, Technical University of Gabrovo
of the materials presented for participation in a competition
to take up the post of the academic position „Associate Professor" in
higher education area - 5. „Technical sciences",
professional field - 5.3 „Communication and computer engineering",
specialty - „Communication networks and systems".

In the „Associate Professor" competition announced in the State newspaper, № 54/25.06.2024 and on the website of TU-Gabrovo for the needs of the Department of Communication Equipment and Technologies at the Faculty of Electrical Engineering and Electronics, as a candidate participating Chief Assist. Prof. Georgi Ivanov Georgiev, PhD.

1. View of content and results in the works presented

The scientific works presented by Chief Assist. Prof. Georgi Ivanov Georgiev, PhD includes 36 publications: 6 in Bulgarian and 30 in English; they were published in co-authorship 1 textbook entitled „Multiplex optical systems and networks" and 2 teaching aids with the names „Modeling and analysis of teletraffic processes in Communications" and „Telecommunication transport lines and optical communications guide". According to the requirements in the „Rules for the acquisition of scientific degrees and to hold academic positions in TU-Gabrovo in scientific aria 5. „Technical sciences", the following indicators have been achieved:

- Indicator „A" – 50 points: the candidate owns the Doctor degree for the developed dissertation with title „Statistical methods for identification and projection of traffic flow parameters in teletraffic systems" with the necessary and attached dissertation publications;
- Indicator „B" – Chief Assist. Prof. Georgi Ivanov Georgiev, PhD has 10 co-authorship publications (4 with 2 author, 2 with 3 author, 3 with 4 authors and 1 with 5 author), referred to and indexed in world-renowned databases (indicator "B.4"), obtaining 217 points by minimum number of 100 points. Nine of these scientific works are reports at international conferences abroad and Bulgaria "EEPES", "BIA", "Telecom" and "CIEES", 1 publication has been published in the International foreign journal "MDPI Engineering Proceedings". 5 of the publications have an Impact Rank SJR (Scopus);
- Indicator „G" – the candidate has indicated a total of 14 publications in editions that have been referred to and indexed in world-renowned databases (indicator „G.7") with 162.65 points and 12 scientific work in unrefined journals with scientific review or in edited copyrighted teams (indicator „G.8") - 140.02 points. 4 of the publications are separate, while the rest are co -authored, of which 1 Impact Factor publication in the journal „Journal of Electrical Engineering - Slovakia" and 6 with a reflected Impact Rank SJR (Scopus). The points achieved from the „G.7" and „G.8" indicators are 302.67 points with a minimum of 200;
- Indicator „D": in connection with the participation in the competition Chief Assist. Prof. Georgi Ivanov Georgiev, PhD has submitted a reference of 15 known citation of his publications in scientific publications, referred to and indexed in world-renowned scientific information (indicator „D.12") with 150 points with a minimum number of 50. From the attached list 8 are from foreign and 7 - from Bulgarian authors.

2. A common feature of the applicant's activity

2.1. Pedagogical activity (working with students and doctoral students)

The candidate initially enrolled as a part-time lecturer at the Department of Communication Equipment and Technologies for the summer semester of the academic year 2018/2019, and since November 2019 has been appointed to the academic position „ Chief Assist. Professor ". As a part-time teacher, he conducted laboratory exercises in the "MSC" specialty in the III and IV year at the Bachelor's Degree in the disciplines „Digital signal processing" and „Data transmission". In the academic period from 2019/2020 to 2022/2023, he conducted hours on „Programming and use of computers", „Communication and computer systems (CCS) " and „Signals and systems", „Communications measurements (CM)", „Digital Signal Processing", „Databases and Cyber-security (DBC)" and „Telecommunication networks and protocols"; „Computer communications (CC)", „Telecommunication networks", „Basics of Teletraffic" and „Commission and Multiplex technique" for the specialties „KTT" and „KTKC" at the Bachelor's Degree. Within the specified period he is a leading lecturer in the disciplines „CCS", „SS" and „CM". From the school year 2023/2024 to the present period he has lecture courses in the disciplines

„CCS“ and „CM“ at the Bachelor's Degree, majoring in “KTCS”, as well as seminar and laboratory exercises under „CCS“, „CM“, „DBC“ and „Application of Artificial Intelligence in Communications“. The Master's Degree is a leading lecturer in the disciplines „Information Protection Systems“, „Web-Based Access Control Systems“ and „Project Management in Communications“ for the specialties „CET“ and „ KTCS“.

Chief Assist. Prof. Georgi Ivanov Georgiev, PhD is the head of 24 graduates from the specialties „CET“, „KTCS“ and „IM“ at the Bachelor's and Master's Degree. He was scientific managed to 7 papers of participants in the Student scientific session. There are 6 publications in co-authorship with doctoral students.

2.2. Scientific and scientific-applied activity

Chief Assist. Prof. Georgi Ivanov Georgiev, PhD has participated in a total of 4 internal projects for TU-Gabrovo at the UCNIT, respectively No. 2305E/15.03.2023, № 2208E/22.03.2022, № 2105E/22.03.2021 and № 20075E/16.03.2020. He is the leader of one of these projects - No. 2305E/15.03.2023 and in 2024 he is also the head of a scientific project. He was a „researcher“ in 1 partner project funded under the Operational Program „Science and Education Intelligence“ - „Digitization of the Economy in the Big Data environment“ during the period 2019 - 2023. According to the scientific works presented on the issues under consideration and tasks in these projects, the following categorization can be made:

- Monitoring of the transmission environment in communications where publications can be indicated: B.4.10; G.7.1; G.7.2; G.7.3; G.7.4; G.7.5; G.7.11; G.7.12; G.7.13; G.8.2; G.8.3; G.8.4; G.8.5; G.8.7 and G.8.9;
- Monitoring and compensating the impact of interference in communication channels for which the results achieved in scientific works are available: B.4.2; B.4.3; B.4.6; B.4.8; G.7.7; G.7.8; G.7.9; G.7.10; G.7.14; G.8.1; G.8.8; G.8.10; G.8.11 and G.8.12;
- Voice analysis and facial diagnostics in biometric and security systems with studies in publications in: B.4.1; B.4.4; B.4.5; B.4.7; B.4.9 and G.8.6.

2.3. Implementation

The candidate Chief Assist. Prof. Georgi Ivanov Georgiev, PhD did not submit documents confirming the implementation of implementation as created patents and other types of information on his scientific-research activity. In connection with his participation in the project „Digitization of the Economy in the Big Data environment“, there are data for adaptation of developed analytical approaches and tools through Machine learning and Artificial intelligence in companies in Gabrovo, supporting activities under basic business functions.

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

The applicant's contributions of Chief Assist. Prof. Georgi Ivanov Georgiev, PhD can be classified as follows:

Scientific contributions - developing:

- methodologies for regression modeling based on a Complete factory experiment, Planning of the experiment in combination with Applied statistics, Artificial intelligence and Heuristic methods on transmission performance indices in communications;

- methodology for establishing the optimum solution with the adaptation of conventional and unconventional methods and algorithms for non-linear optimization, quality control in diagnostics and verification of information excerpts for obtained regression models for predictive analysis of specific factors of the applied environment and registered interference in the communication channels for relationship.

Scientific-applied contributions - development of:

- approaches for an forecast analysis of specific QoS transmission environment parameters, bound to the efficiency and speed of transmission of packages in communication systems, including FFNN, GRNN, CFNN, ANFIS tools using hybrid training algorithms;

- approaches to Administration of Network Traffic and Access to Internet Resources and Services for Corporate Customers in the conditions of different streaming loads with Integration of FFNN, PNN, K-NN, DT based on the principles of deep learning;

- approaches to recognize tones with frequency range variation and RMS noise levels, personalized speech fragments after spectral analysis with adaptation of multilayer FFNNs, ANFIS, DA, NB, k-NN, DT

analytical ways with various probability features on information excerpts and functions of neural activation;

- hybrid approaches for spectral diagnostics, descriptive analysis and identification of disorders and signals with reflected noise presence during selection of DA, FFNN, k-NN, NB, SVM, ANFIS analytical instruments in communication channels for ICT Infrastructure Communication Channels;

- approaches for the selection of informative signs based on FFT spectral analysis, diagnosis of noise indicators and Discreet wavette transformation in speech synthesis, voice analysis and recognition of images maintained in various formats in the authentication and verification of the user access;

- FFNN, PNN, ANFIS, k-NN adaptation methodology with Deep Learning Principles in the diagnostics of voice profiles and facial image in single-madigical biometric systems to provide physical access and cyber-security when operating with clusters of data on different hierarchi levels.

Applied contributions:

- creating analytical instruments and applications with Artificial intelligence with voice control in Systems „Intelligent home“ for security and activation of electronic utensils and devices;

adaptation and synthesis of neural models as tools to limit distortions in the form of signals in communication channels to connect to the presence of noises;

- developing of Web-based platform for remote management of tools for designing and examining the output characteristics of recursive and non-recursive filtering units.

4. Applicant's personal contribution assessment

Analyzing the specifics of research on the implementation of machine learning technologies and artificial intelligence in the field of communications, I believe that the offered contributions have a serious share of Chief Assist. Prof. Georgi Ivanov Georgiev, PhD participation. His independent publications, those who are first and foremost, are proof of his leading involvement in science-research. What is striking is the significant share of the publications in the indicated directions of the research carried out, indexed and refined in the world-renowned databases such as Scopus, IEEE and other.

5. Critical notes and recommendations

I have no significant remarks about the applicant's submitted documents, characterized by good systematization and precision. I can make the recommendation, seek the balance between my educational and science-research activities.

6. Impressions

Chief Assist. Prof. Georgi Ivanov Georgiev, PhD is a lecturer at the Technical university of Gabrovo, which began in 2009. He gradually passed through the positions of Assistant to the Department of OEE and “Chief Assistant Professor” from 2019 to the present moment at the Department of Communication Equipment and Technologies at the Faculty of Electrical Engineering and Electronics of TU-Gabrovo. He has very good competence in the scientific fields in which he works and great professional training for research. He is well known to the scientific community. Confirmation of this is the high H-Index equal to 5 and the number of citation 61 according to the world-renowned SCOPUS database.

7. Conclusion:

In view of the above, I propose Chief Assist. Prof. Georgi Ivanov Georgiev, PhD to be awarded the academic position of “Associate Professor” in the field of higher education – 5. Technical Sciences, professional field – 5.3. Communication and Computer Engineering, specialty – “Communication Networks and Systems”.

01.10.2024 Member of the scientific jury: /signature/

/Assoc. Prof. Boyan Karapenev, PhD/