OPINION

from Assoc. Prof. Agata Hristova Manolova, PhD
academic position „Associate Professor",
professional field 5.3. „Communication and computer engineering",
Technical University of Sofia

Concerning a procedure for obtaining an academic position "Associate Professor" in the area of higher education 5. Technical Sciences, professional filed 5.3 "Communication and Computer Engineering", specialty "Communication Networks and Systems", declared in the State Gazette No 58 from 23/07/2019 and on the site of TU - Gabrovo for the needs of the Department of Communication Equipment and Technologies of the Faculty of Electrical Engineering and Electronics

Candidate Assist. Prof. Eng. Ivelina Stefanova Balabanova, PhD

1. An overview of the content and results of the submitted works

In relation to the procedure, a total of 43 scientific papers including one written monograph, 37 publications in collections of national and international scientific conferences and journals and 5 teaching and methodological manuals have been submitted for opinion .

I have accepted for reviewing 43 scientific works. The publications can be divided into the following categories - 18 in Bulgarian, 19 in English, 5 as individual author, 32 co-authored, 2 with Impact Factor (IF), 9 indexed in Scopus , one of which with IF; 1 with IF indexed in Web of Science.

The scientific works can be classified in two main directions:

- Modeling processes and objects with application in telecommunication transmission lines and optical communications with relevant publications [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 , 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 32, 33, 36 and 37] and manual [4];
- Designing virtual tools and creating objects for noise identification during signal processing in communication circuits , including scientific works [27, 28, 29, 30, 31, 34, 35], manuals [1, 2, 3, 5] and monograph [6].

Applicant meets the relevant minimum national requirements , respectively indicators B, G and D (information from Scopus, six citations are registered of works of assist. prof. Balabanova).

2. General characteristics of the applicant's activities
2.1. Educational - pedagogical activity (students and doctoral students)

Ivelina Balabanov was appointed assistant in the department "Communications Equipment and Technologies" at the Faculty "Electrical engineering and electronics" in TU - Gabrovo in 2005 and from 2007 has been appointed assistant professor.

As a lecturer, she conducts seminars and laboratory exercises in "Educational Practice" , "Signals and Systems" , "Communication Circuits" , "Telecommunication Transmission Lines" and "Communication and Multiplex Engineering" for Bachelor degree students, I, II, III and IV courses in part-time and full-time education , majoring in Mobile and Satellite Communications and Communication Technology. The candidate read lectures in the

following subjects "Communication Circuits" , "Communication and multiplex equipment" , "Telecommunication Transmission Lines" , "Teletraffic Theory" and "Electromagnetic compatibility" of Bachelor and Master degree students (part-time and full-time) in III and IV year including lectures and laboratory exercises in the disciplines "Communication Circuits" and "Optical communications" for Master degree students in preparatory training from the college in the town of Lovech.

During her time as an academic member of the department Ivelina Balabanova has guided 56 Bachelor's and Master's degree students in finishing successfully their studies. She has written 37 reviews for diploma works. She has been a member of the state examination committees 53 times . During her work with students and PhD students , as well as in her research , she has applied a number of software products such as LabVIEW, MATLAB, STATISTICA, Visual Basic, Altium Designer, Multisim, computer network design and diagnostics programs such as Cisco Packet T racer and others .

For her many years of practice as a teacher, the candidate has gained serious skills and knowledge to work successfully with students . The numerous hours of lectures significantly exceed the minimum requirements for occupying the academic position of "Associate Professor" . All disciplines, lead by the candidate coincide with the scientific specialty , in which she applies currently. I value these indicators as more than sufficient , taking into account Art . 54 (1), points 3 and 4 of Regulation a for the acquisition of academic degrees and occupation of academic positions at the Technical University of Gabrovo.

2.2. Scientific and scientific - applied activity

Ivelina Balabanova was a participant in 7 scientific projects completed in TU - Gabrovo, one of them being jointly with - the Ministry of Economy, Energy and Tourism . She was the head of one contract.

The candidate ' s scientific and applied interests are in the fields of optical communications and teletraphic design , computer modeling , neural and neural - fuzzy systems , Data Mining processes and others .

Participation in scientific projects , allowing the applicant to apply her knowledge and skills in communication and computer equipment , and the resulting publication activity, proves the high scientific level of the applicant and shows her teamwork skills.

2.3. Implementation activities

The applicant's implementation activity is related to the introduction into the educational process of the disciplines she has helped create, the laboratory exercises and installations, as well as software applications for research and analysis in optical communications and digital signal processing . In terms of the contract, which she was the head, a WEB- based information platform was developed for the analysis of the processes and factors in the transmission of television signals and improving the quality of service.

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

By analyzing the presented for my opinion materials, I can summarize the contributions as scientific-applied and applied, divided in specified sections.

Scientific-applied contributions in the first section:

- Analysis of the processes of transmitting optical pulses and CSO, CTB and CNR effects in fiber - optic systems . It was found, that the receiver sensitivity sharply deteriorates, when the expansion pulse is about 0.3 times the

length of the input and impulse, and it was established the location and regime elements to enhance the QoS;

- Methodologies have been developed to calculate optoelectronic analog circuits, drivers for laser diode control to determine the probability of failure in spectral multiplexing networks, and to limit the impact of problems with channel asymmetry in cable television networks;

- Artificial neural networks have been selected for the recognition and classification of telecommunication systems with obvious losses, parameters for models of voice services, service devices for the $D+M+H_2+E_3/D/n/k$ system and Markov chains;

- Different architectures of neural-fuzzy systems were investigated for identification of parameters and servicing devices of teletraphic models of voice sources and system $D+M+H_2+E_3/D/n/k$ and Markov chains without and with space limitations waiting in the queue;

- Analyze the types of structures for multiple choice decision and metric units for distances methods such as decision tree and k –nearest neighbors categorization of Markov chains with limited and unlimited amount of tail, systems with apparent losses, models of voice services and $D+M+H_2+E_3/D/n/k$ systems;

- Mathematical models have been obtained in the planning of the experiment and a regression analysis to determine the average residence time in the system and the probability of losses in a teletraphic model of voice services;

- Evaluation of the impact of call intensities and λ_i and time t_d on the average stay time in the system and the likelihood of losses in the voice service model in cases without and with planning experiment plans were evaluated;

- Regression models for predicting changes in the time of receipt and release of system-served user requests have been derived when planning the Marcov chain experiment at one and multiple server stations.

Applied contributions in first section:
- Schematic solutions have been developed for generating phase impulses, converting illumination into impulse series and electronic instrument for multichannel air temperature measurement;

- LabVIEW-based applications have been created that implement neural and neural-fuzzy diagnostics for quantitative identification and analysis of teletraphic service devices and inbound traffic.

Scientific-applied contributions in the second section:
- A monograph is written, associated with synthesis models for data mining processing electrical signals with added noise based on artificial neural networks, adaptive neural-fuzzy interface systems, methods k - nearest

neighbors and decision trees, discriminant and regression analysis, Bayes classification.

- Discriminant linear and neural - fuzzy classifiers were applied to identify analog and digital signals with the presence of "Periodic Random Noise and Pink Noise" and "Permanent White Noise and Pink Noise" ;

- Multilayer architectures of artificial neural networks with back propagation of error in signal identification without and with six types of noise have been investigated;

- Information systems have been developed to design and investigate the characteristics of digital filters with authorization to access Microsoft SQL and MySQL databases for remote management for scientific and educational purposes .

Applied contributions in the second section:

- Virtual tools have been created for computer modeling, testing and analysis of the behavior of recursive and non-recursive filters, digital processing and statistical analysis of signals;

- Relational database architectures of Microsoft SQL and MySQL environments have been designed to accumulate data before and after filtering electrical signals.

4. Assessment of the applicant's personal contribution

I can state that the individual contribution of assist. prof. eng . Ivelina Balabanova, PhD in the presented research results are relevant for the theory and practice. I mainly focus on her innovative application of mathematical tools used in identifying signals that reflect different types of noise in telecommunication processes.

Acknowledgments for the candidate's contributions are the received honors and prizes for presented papers at Conferences with international participation at the Angel Kanchev University of Ruse and Student Scientific Session at the Technical University of Gabrovo, as well as from several citations of her publications by international authors.

5. Critical notes and recommendations

I have some minor remarks regarding the materials presented, such as :

- Material [32] from the list of publications, indicated as indexed in Web of Science in the author's documentation is the only publication in a foreign journal;

- In the author's reference to the specified 10 publications , referenced in Scopus, actually they are 9, 1 of the material with the IF is indexed in Web of Science;

- Some repetitions and stylistic inaccuracies are noticeable in the publications.

The remarks made do not in any way undermine the work of eng . Ivelina Balabanova . As recommendations for future research and creative activity I encourage her to continue to

publish in journals, indexed in the recommended databases and those with impact factor, and seek opportunities to implement her achievements in business applications.

6. Personal impressions

My first personal impressions of the candidates in the competition are recent, but they are entirely positive. Over the years, Mrs. Balabanova has proven herself as an academic, an ethical colleague, thorough scholar and innovative teacher, as the evidenced presented to my attention documents. So the mentioned above findings are based on direct personal impressions, not just on paper. I can summarize, that my impressions are positive and I can make recommendations in clear conscience as described below. The overall impression of the candidate's teaching and research abilities are very high.

7. Conclusion:

In conclusion, I believe that the scientific papers I have been provided, the applied and scientific results, as well as all the teaching and research activities of the applicant meet all the requirements of the Bulgarian law for academic positions, the Regulations for its implementation in the Republic of Bulgaria and the Regulations for the terms and conditions for taking over academic positions in TU-Gabrovo.

I consider it reasonable to propose for Assist. Prof. Ivelina Stefanova Balabanova, PhD, to obtain an academic title "Associate Professor" in the in the area of higher education 5. Technical Sciences, professional filed 5.3 "Communication and Computer Engineering", specialty "Communication Networks and Systems".

23.10.2019   Member of the scientific jury: /signature/

                /Assoc. Prof. A. Manolova, PhD/