

OPINION

Authored by Prof. Georgi Lyubenov Iliev, PhD, Technical University – Sofia, Concerning scientific works submitted for participation in competition for awarding the academic position of “Professor” in the field of higher education 5. Technical Sciences, professional field 5.3. “Communication and Computer Engineering”, scientific specialty “Communication Networks and Systems”, (Signals and Systems, Radio communication equipment)

In the competition for “professor”, announced in the State Gazette, issue 50 / 15.06.2021 and on the website of TU-Gabrovo for the needs of the Department of "Communication Equipment and Technologies" (CET) at the Faculty of "Electrical Engineering and Electronics", as the only candidate participates **Assoc. Prof. Stanimir Mihaylov Sadinov, PhD** - Technical University of Gabrovo.

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

The candidate in the competition Assoc. Prof. Stanimir Mihaylov Sadinov, PhD participated with a total of 37 publications (of which 10 scientific publications equivalent to a monograph and 27 - outside the equivalent of a monograph), distributed as follows:

- 17 issues are published in international journals, referenced in SCOPUS / WoS, and 3 of them are in journals with Impact factor (research journals: Elektronika ir Elektrotechnika-Litva IF 1,128; Journal of Electrical Engineering-Slovakia IF 0,647; Proceedings of The Bulgarian Academy of Sciences-Bulgaria IF 0,378;
- 10 issues are reports from international conferences, published in refereed and indexed in world-famous databases with scientific information (SCOPUS);
- 10 issues are in editions from the National reference list of Bulgarian scientific journals with scientific review (of which 4 articles in journals and 6 reports from scientific conferences);

5 of the candidate's publications are independent; with one co-author are 2; with two co-authors are 10 and with three or more co-authors are 20. The candidate is first in 13 publications and second - in 6. The candidate is a co-author in 2 published textbooks and 2 teaching aids.

The works submitted for the competition are grouped in three thematic areas: Signals and systems [B.4.3, B.4.7, B.4.8, B.4.10, B.4.14, Г.7.2, Г.7.3, Г.7.7, Г.7.11, Г.7.12, Г.8.5]; Radio communication equipment and broadcasting [B.4.5, B.4.6, Г.7.1, Г.7.4, Г.7.6, Г.7.8, Г.7.10, Г.7.13, Г.8.6, Г.8.7, Г.8.9]; Optical and cable communication networks [B.4.1, B.4.2, B.4.4, B.4.9, B.4.11, B.4.12, B.4.13, Г.7.5, Г.7.9, Г.8.1, Г.8.2, Г.8.3, Г.8.4, Г.8.8, Г.8.10].

The author's reference of noticed citations of the works on the competition contains a total of 24 citations of 16 publications, 14 of which are referred to in SCOPUS.

2. General characteristics of the candidate's activity

2.1. Educational and pedagogical activity (work with students and doctoral students)

Assoc. Prof. Stanimir Mihaylov Sadinov, PhD is a lecturer at the Technical University - Gabrovo, Faculty of Electrical Engineering and Electronics, Department of Communication Engineering and Technology since 2000 and has held the following positions: Assistant since 2000. until 2003, then senior assistant until 2005 and chief assistant until 2009 and associate professor - from 2009 until now.

During the period 2016 - 2021 the average annual classroom employment of the candidate is over 650 hours. During the same period, the candidate is a holder of 3 disciplines in the Bachelor's degree - "Signals and Systems", "Radio Communication Equipment" and "Television

Equipment", and 2 disciplines in the Master's degree - "Broadband Mobile Networks", "Satellite Communication Systems" for the specialty CET.

The educational and pedagogical activity of Assoc. Prof. Stanimir Sadinov, PhD includes: the management of over 170 graduates is a bachelor's degree and a master's degree; the management of 8 doctoral students, of which currently 4 have successfully defended dissertations in the doctoral program "Communication Networks and Systems".

2.2. Scientific and scientific-applied activity

The candidate Assoc. Prof. Stanimir Sadinov, PhD has documented his participation in a total of 13 projects, of which 4 international, 2 national projects under Operational Programme "Science and Education for Smart Growth", 2 are national projects under the national "Scientific research" fund of Ministry of Education and Science and 5 are university research projects at University Center for Research and Technology of TU-Gabrovo, 1 of them has an external assignor. In 4 of the intra-university projects the candidate is a manager.

2.3. Implementation activity

No reference or official notes have been submitted for the candidate's implementation activities. However, from the documentation attached for participation in the competition it can be concluded that he participated in the development of demonstration scientific and educational models and models implemented for teaching and research purposes at the Department of Communication Engineering and Technology at TU - Gabrovo. His participation as a leader, expert and coordinator in international and national projects with external organizations - Gabrovo Municipality and companies, are also evidence of the implementation of his research in favor of innovation and efficiency indicators in favor of business.

3. Contribution (scientific, scientific-applied, applied).

Analyzing the materials presented to me for opinion, the contributions in them can be summarized as scientific-applied and applied.

In my opinion, the *scientific-applied* contributions can include:

- Simulation models have been created for the study of signals and systems in the latest generation of mobile cellular networks, digital television distribution, digital modulations and the communication channel associated with them;
- An innovative approach has been developed for the identification of Markov teletraffic circuits by means of multilayer neural networks with error back propagation and decision tree structure;
- Inverse propagations and hybrid algorithms based on artificial intelligence (AI) and adaptive neuro-fuzzy interface system (ANFIS) in signal processing have been synthesized;
- Presented approach for application of QoS procedures for analysis and study of the impact of different types of noise in communications - uniform white noise (UWN), Gaussian white noise (GWN), Bernoulli noise (BN) and Poisson noise (PN). Created simulation models for identification of noise signals of different shapes using a virtual tool LabVIEW and adaptive neurally fuzzy interface system;
- An algorithm for simulation modeling of a teletraffic model of voice services on/off+h/m/l/k has been developed, as well as predictive mathematical models based on regression analysis with respect to the average residence time in the system and the probability of losses ;
- Models of a wireless MIMO channel for communication in an indoor environment have been synthesized and studied, taking into account the characteristics and spatio-temporal properties of the channel, the electromagnetic propagation of the signals and the parameters of the used antennas;
- Models have been created for research, analysis and evaluation of the performance of high-speed (from 10 to 40 Gbps) single-channel optical networks using different formats for optical

signal modulation (NRZ, RZ, CSRZ, DM, MDRZ), different schemes for compensation of dispersion (symmetric compensation, pre- and post-compensation) and solving optimization problems;

- Simulation models of multi-channel (4 and 8 channel) high-speed (10 to 40 Gbps) optical communication networks have been developed and studied for solving optimization problems according to the criteria of achieving the minimum value of BER (Min. BER) or maximum Q factor and providing maximum performance and efficiency of the network at different input parameters of the signals;

- Developed, tested and analyzed a simulation model of an optical 8-channel OQPSK modulated DWDM system with a capacity of 40 Gbps per channel and taking into account the impact of nonlinear effects in assessing the deterioration of system performance;

- Methodologies based on the iterative approach for optimal planning and sizing of the length and number of amplification sections in coaxial and optical transmission networks have been developed;

- Models for design, research and implementation of prognostic analysis of the reliability and fault tolerance of communication networks, systems and service devices through the application of Markov circuits have been synthesized.

Applied contributions are:

- A LoRaWAN platform has been designed to provide experimental access for creating and testing applications for intelligent communication in IoT (Internet of Things), evaluating the effectiveness of technology and the quality of the provided radio coverage in urban environments;

- Demonstration models of a communication multi-channel LoRaWAN gateway and of a LoRa-based communication platform for application in the systems for intelligent management of parking lots and garages, as well as for educational and research purposes, with application of software-defined radio systems have been developed;

- Radio coverage of the LoRa/LoRaWAN network on the territory of the city of Gabrovo as part of a platform for communication and testing of applications based on the developed complete LoRaWAN architecture was studied;

- A module has been developed for receiving and retransmitting digital satellite (DVBS/S2) signals over an IP network and for real-time monitoring of the parameters of the transmitted satellite signals;

- The parameters and characteristics of a satellite channel for transmission of digital television programs in standard DVB-S/S2 have been experimentally studied. An experimental laboratory model with the necessary measuring instruments and software was synthesized;

- A practical model of passive optical network (PON) has been developed for the delivery of interactive services to perform three main tasks: to provide convenient and easy staff training; to allow a wide variety of practical research (traffic processing, introduction of new services and modules for management and communication, etc.); to be a platform for conducting general research in the field of passive optical networks.

4. Assessment of the candidate's personal contribution

I can evaluate the individual contribution of Assoc. Prof. Stanimir Sadinov, PhD in the presented research and results as significant for the theory and practice. I mainly focus on the presented scientific-applied and applied developments in the thematic areas of the competition, related to signals and systems, radio communication equipment and optical communication systems for educational, research and scientific purposes.

5. Critical remarks and recommendations

I have no serious remarks and recommendations to the presented materials, but I can note the following:

