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O P I N I O N

by Prof. Dr. Plamen Zlatkov Zahariev, PhD,
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on the materials, submitted in the competition for the academic position "Professor"
in the Higher Education Area 5. Technical Sciences,
Professional Field 5.3 Communication and computer technologies,
Scientific Specialty – "Communication Networks and Systems" (Wireless Communications and Cybersecurity in Wi-Fi Networks, Internet of Things (IoT), and Cybersecurity Systems)

The competition for the academic position "Professor" was announced in the State Gazette, Issue 48 from 13.06.2025 and on the website of the Technical University - Gabrovo, and is for the needs of the Department of "Communication Engineering and Technologies" at the Faculty of "Electrical Engineering and Electronics". The candidate in the competition is Assoc. Prof. Dr. Eng. Krasen Kirov Angelov from the Technical University - Gabrovo.

As a member of the Scientific Jury, appointed by Order No. 3-01-411 of 25.09.2025 of the Rector of the Technical University - Gabrovo, I have received a full set of documents, which are meeting the requirements for occupying the academic position of "Professor".

1. Review of the content and results of the submitted works

Assoc. Prof. Dr. Eng. Krasen Angelov is participating in the competition with a total of 41 publications. They can be categorized as follows:

- ✓ 26 scientific publications in refereed and indexed publications;
- ✓ 15 scientific publications in non-refereed journals or in edited collective volumes.

From the 41 total submitted scientific publications, twenty-six are in English language while the rest are in Bulgarian language. Six of the publications are authored by the candidate, while the rest are published with various numbers of co-authors. Twenty-three of these publications are indexed and refereed in Scopus, and further three of the publications are available in both Web of Science and Scopus. According to the minimum national requirements for the points by indicator groups, the candidates for the academic position "Professor" in the scientific field "Technical Sciences" and in the professional field 5.3 " Communication and computer technologies" must have scientometric indicators equal to or exceeding the following minimums - for indicator group A - 50 points, for indicator group B - 100 points, for indicator group D - 200 points, for indicator group E - 100 points and for indicator group E - 150 points. The points calculated by the candidate for all indicators, which I am accepting, are - for indicator group A - 50 points, for indicator group B - 138 points, for indicator group D - 403.03 points, for indicator group E - 260 points and for indicator group E - 261.92 points.

The candidate meets all formal requirements and fully covers the quantitative criteria for all groups of indicators, with groups of indicators D and E having respectively 2 times and 2.5 times the number of points required.

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2. General Overview of the activities of the candidate

2.1. Teaching and Academic Activities (work with students and doctoral candidates)

Assoc. Prof. Krasen Angelov is the author or co-author of the curricula for the courses "Wireless Communications and Cybersecurity in WiFi Networks", "Access Control Systems", "Internet of Things (IoT) and Cybersecurity Systems", "Information Cybersecurity Management Systems", "Security and Monitoring Systems", "Broadband Mobile Networks" and "Electromagnetic Compatibility". These courses are included in the curricula of the specialties at the Faculty of Electrical Engineering and Electronics for full-time and part-time study in the Bachelor of Science and Master of Science degree programs. Assoc. Prof. Angelov is the lecturer for the listed courses and fulfils the standard for academic employment.

The candidate has been the supervisor of 4 PhD students, one of whom has successfully defended and acquired the PhD degree, while the other three are still enrolled in the study programs.

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2.2. Scientific and research-applied activity

Twenty-six of the publications of Assoc. Prof. Angelov for the procedure are indexed and referenced in the Scopus database, with three of them also available in Web of Science. Three of these publications are in journals with "Impact Factor", while another 8 are having SJR rank.

In Scopus, Assoc. Prof. Angelov has a total of 39 indexed documents, which at the time of the preparation of this opinion have been cited 89 times. In WoS, Assoc. Prof. Angelov has a total of 39 indexed publications, which have been cited 3 times. Assoc. Prof. Angelov's H-index in Scopus is 5, and in WoS is 1. The citations of Assoc. Prof. Angelov's scientific works in the Scopus and WoS databases are an excellent confirmation for the quality of his research activities.

Assoc. Prof. Angelov is member of IEEE and member of the Union of Scientists in Bulgaria. He has participated in a number of national and international conferences, congresses, seminars and events. He has participated in four projects and/or contracts for attracting funds from scientific activities or scientific products.

2.3. Implementation and Innovation Activity

The candidate has participated in the development and implementation of a system for measurement, visualization and control of electrical and non-electrical parameters of low-voltage power supply networks, as well as an energy-efficient narrowband long-range communication network (LoRa) in the Internet of Things (IoT) concept, which is used for controlling and monitoring of indoor lighting systems.

3. Contributions (scientific, research-applied, applied). **Significance of the contributions to science and practice**

Assoc. Prof. Krasen Angelov has presented a reference with 16 scientific, research-applied and applied contributions, as follows:

1. **A modified image encryption scheme based on the OTP (One-Time Pad) algorithm is developed, consisting of chaotic synchronization (based on feedback control to create complex and unique encryption keys) and artificial neural networks (ANN) for improved security and efficiency and resilience to various cryptographic attacks (brute force attack, differential attack, noise and data slicing attacks, key sensitivity and computational complexity).**

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2. **An approach to categorization of roles and responsibilities of cybersecurity stakeholders in IoT ecosystems, prioritization and allocation of resources to address the most critical security risks in building a secure and reliable IoT platform is proposed and investigated.**
3. **Simulation models are developed for predicting and analysing the radio coverage of a LoRaWAN network to determine its maximum range, parameters and quality of service, performance at different values of the expansion factor.**
4. **Simulation models for analysing the performance of IoT communication protocols for the application layer (AMQP, CoAP and MQTT) have been developed.**
5. **A demonstration model has been developed for implementing an energy-efficient narrowband communication network with a wide range (LoRa) in the Internet of Things (IoT) concept for controlling and monitoring indoor lighting systems.**
6. **A system for measuring, visualizing and controlling electrical and non-electrical parameters of low-voltage power supply networks has been developed.**
7. **A solution has been developed for autonomous power supply of LoRaWAN end device with a photovoltaic panel and optimizing energy consumption in different operating modes.**
8. **A smart home electrical control and power supply panel has been developed that supports functionality for IoT control, manual/automated control and real-time monitoring of electrical energy.**
9. **A LoRa-based solution for remote intelligent control and monitoring of household appliances in a home automation system has been developed.**
10. **An approach for designing, building and deploying low-power mesh networks in an indoor scenario based on IQRF technology is proposed and investigated.**
11. **A conceptual model of a VLC system using wavelength division multiplexing (WDM) for simultaneous transmission of data streams from different sources over a free space (FSO) channel with application for vehicle communication in urban and rural environments is synthesized and investigated.**
12. **A robust control is synthesized for a class of nonlinear systems with parametric uncertainties through modified input-output linearization via feedback with linear-nonlinear decomposition.**
13. **A neural network model that combines spatial data obtained using convolutional neural networks (CNN) with sequential data analysed using long short-term memory (LSTM) networks was synthesized and studied for the purpose of predicting radio wave attenuation in a 5G network.**
14. **A downlink physical layer simulation model based on MATLAB 5G NR was synthesized and studied for the purpose of realistic performance evaluation of 5G NR.**
15. **A model for performance analysis and solving optimization problems in DWDM-PON networks was developed and studied.**
16. **Models have been created for research, analysis and evaluation of the performance of high-speed multi-channel optical networks using different optical signal modulation formats (NRZ, RZ, CSRZ, DM, MDRZ), different dispersion compensation schemes (symmetric compensation, pre- and post-compensation) and solving optimization problems**.

Based on the scientific works by Assoc. Prof. Angelov, I fully agree with the defined and presented contributions. They all relate to the areas of cryptography, communication and computer security, wireless networks, IoT networks and systems, LoRaWAN technologies, artificial intelligence and neural networks, optical networks, etc.

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4. Evaluation of the personal contribution of the candidate

The personal contribution of the candidate to the scientific research is clearly emphasized – 15% of the scientific publications under the procedure are the result of the individual work of Assoc. Prof. Angelov, and in many of the remaining research papers he is the leading co-author.

Assoc. Prof. Angelov has participated in international and national projects and has been a member of the committees of prestigious scientific conferences in Bulgaria and abroad. He has participated in the implementation of scientific research activities and projects.

5. Critical Remarks and Recommendations

Overall, I have no significant critical remarks on the materials submitted under the procedure. However, I recommend to Assoc. Prof. Dr. Krasen Angelov:

- **to increase his participation in the writing and implementation of national and international projects.**
- **To concentrate his research efforts on the publication of articles in prestigious scientific journals, as well as in journals with Impact Factor.**

6. Personal Impressions

I have personally known Assoc. Prof. Krasen Angelov for more than 10 years. My impressions of him are very good and have been acquired as a result of our joint work on scientific projects, as well as from Assoc. Prof. Angelov's participation in procedures for PhD degrees at the University of Ruse "Angel Kanchev".

In my opinion, Assoc. Prof. Dr. Eng. Krasen Angelov is a well-established researcher and university lecturer who has gone through the various phases of the academic development.

CONCLUSION

The materials submitted by the candidate satisfy all of the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), its Procedural Rules, as well as the Procedural Rules of the Technical University - Gabrovo.

Considering the above, I propose that Assoc. Prof. Dr. Eng. Krasen Kirov Angelov be elected to the academic position of "Professor" in the field of Higher Education - 5. "Technical Sciences", Professional Field - 5.3 "Communication and Computer technologies", Specialty - "Communication Networks and Systems" (Wireless Communications and Cybersecurity in WiFi Networks, Internet of Things (IoT) and Cybersecurity Systems) in the Department of "Communication Engineering and Technologies" at the Faculty of "Electrical Engineering and Electronics" of the Technical University - Gabrovo.

05.11.2025
Ruse, Bulgaria

Member of the Scientific Jury:
/Prof. Dr. Plamen Zahariev, PhD/