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OPINION

by Prof. Eng. Petar Krasenov Boyanov, PhD,
Professor at the Department "Communication and computer technology and security technologies", Faculty of Technical Sciences, Konstantin Preslavsky University of Shumen, on the scientific production submitted in the competition for holding the academic position "Associate Professor" for a military personnel in the field of higher education 5. Technical Sciences, professional field 5.3 Communication and computer technology (Radio transmitting and receiving technology)

In the competition for "Associate Professor", announced in the State Gazette, Issue 29 of 04 April 2025 and announced by Order № OX-293 dated 25 March 2025 by the Minister of Defense of Republic of Bulgaria and Decision of the Scientific Council of the Defence Institute "Professor Tsvetan Lazarov" for the selection of a Scientific Jury, protocol No. 116 of 29 May 2025, as the only candidate participating is **Col. Eng. Ivan Penchev Ivanov, PhD**, Head of Directorate "Development of C4I Systems" at the Defence Institute "Professor Tsvetan Lazarov".

1. Brief biographical information

Colonel Dr. Eng. Ivan Penchev Ivanov (born September 1, 1969, in Veliko Tarnovo, Bulgaria) holds a Doctor of Philosophy (PhD) degree (2004) in "Radio transmitting and receiving technology" and a Master of Science (MSc) degree (2007) in "Organization and Management of CIS (Command Information Systems) in Defense" from the "G.S. Rakovski" Military Academy. He graduated from the "Vasil Levski" Higher Combined Arms Command School in 1993 with majors in "Signal Troops" and "Communications and Security Equipment Technology".

His extensive qualifications include numerous specialized courses in Bulgaria and abroad (Slovakia, USA), encompassing training in CIS (Command Information Systems), Information Operations (IO), Strategic Management, and the English language (STANAG 6001, Level 3-3-3). He achieved outstanding academic evaluations during his training in the USA. His military career spanned over 30 years (1993-2025), progressing in rank from Lieutenant to Colonel.

He specializes in the field of Communication and Information Technologies (CIT) for Defense, with specific expertise in Radio Communications, Command, Control, Communications, Computers, and Intelligence (C4I) Systems, and Information Security (INFOSEC). This background makes him exceptionally well-suited for Professional Field 5.3 "Communication and computer technology".

In this regard, the candidate meets the requirements of article 24, paragraph 1 and 2 of the Act on Development of the Academic Staff in the Republic of Bulgaria.

2. General characteristics of the candidate's research and applied scientific activity

Colonel Eng. Ivan Penchev Ivanov, PhD is the sole candidate in the competition for the academic position of "Associate Professor". For the competition, he has presented one monograph and 24 publications (22 papers and 2 articles) from his research scientific activity. Fourteen of these scientific works are co-authored, while the rest are sole-authored. All papers are written in Bulgarian, and the two articles are written in English, separately indexed in Scopus. Based on the submitted documentation, the candidate has provided the required number of publications necessary for the position of Associate Professor. The monograph is in Bulgarian, aligns with the competition's thematic area, and was developed for the Institute of Defence "Professor Tsvetan Lazarov".

The candidate Colonel Eng. Ivan Penchev Ivanov, PhD submits a report-declaration for the minimum national requirements for occupation of the academic position "**Associate Professor**" as follows: Group A: 50 points; Group B: 100 points; Group G: 355 points; Group D: 198 points. **The total points from the indicator groups are 703.** The presented monograph, scientific publications, and cited references for Colonel Assoc. Prof. Dr. Eng. Ivan Penchev Ivanov fully **meet the minimum national requirements for occupation of the academic position "Associate Professor" in the field of higher education 5. Technical Sciences, professional field 5.3 Communication and computer technology and meets the requirements of article 2b, paragraph 2 and 3 of the Act on Development of the Academic Staff in the Republic of Bulgaria.**

His scientific research focuses on developing telecommunications and information technologies for defence applications, with primary emphasis on creating robust radio communication systems for reliable command, control, and information exchange, particularly within weapon control systems. More recently, his research concentrates on designing universal radio engineering solutions based on software-defined radio principles. These platforms integrate combined capabilities for communication, radar detection, navigation, and electronic warfare. The achieved results directly contribute to modernizing the communication and information environment of the Bulgarian Armed Forces. His current monograph reflects this main research direction by detailing the design and implementation of radio communication networks and

systems using software-configurable RF platforms. His activity includes participation in two international and one national scientific project, along with numerous departmental initiatives focused on establishing and implementing modern telecommunication and information infrastructures. The outcome of this applied scientific work comprises over twenty specific developments, including communication complexes, information modules, specialized methodologies, and software products, with the majority already operationally implemented for defence needs, thereby practically realizing many of his published theoretical findings.

3. Main scientific results and contributions

The scientific production of Colonel Eng. Ivan Penchev Ivanov, PhD by objective, tasks and thematic content in the following three main fields can be classified:

1. Architectures and implementations of software-defined and cognitive radio systems

A critical review and in-depth analysis of the concepts for SDR and cognitive radio communication has been conducted. Advanced architectural solutions have been developed through the implementation of cognitive logic, cloud computing [II.2.11, II.2.17, II.2.19], polyphase filters [II.2.18] and adaptive communication environments [II.2.21]. Functional prototypes of multifunctional radio systems for tactical applications have been created, validated through simulations and experiments in the GNU Radio environment. Improvements in efficiency and reliability under varying environmental conditions have been reported [II.1.1].

2. Innovations in communication and information technologies for defense and security

Technological opportunities for modernizing the communication infrastructure in the defense sector have been identified [II.2.3, II.2.6, II.2.8]. Hybrid solutions utilizing cloud platforms have been presented, along with proposed guidelines for building departmental networks according to standards such as TETRA [II.2.10, II.2.12, II.2.14]. Models for visualization using augmented reality and algorithms for structuring flight data have been developed [II.2.13]. Cyber threats in the maritime industry have been analyzed, with proposals for strengthening digital resilience [II.2.15].

3. Development of active and passive radar systems using SDR

Modern approaches for building contemporary radars using software-defined platforms have been evaluated [II.2.15]. Configurations for passive radars with single-band and dual-band operation, utilizing available communication signals (e.g., DVB-T, LTE), have been designed. The capability for secure monitoring and system adaptability using the USRP software-defined platform has been demonstrated, with an emphasis on efficiency in real-world applications [II.2.16, II.2.20].

The documentation presented by the candidate attests to the relevance of the conducted scientific research, which has received recognition through 39 citations in peer-reviewed scientific publications. No indications of plagiarism were identified, confirming both the authorship and the original contribution of the candidate in the respective scientific field.

4. Assessment of the significance of the contributions to the science and practice

The evaluation of the scientific and applied contributions of Colonel Eng. Ivan Penchev Ivanov, PhD demonstrates a high degree of significance, particularly within the defense sector. His developments in the field of software-defined and cognitive radio systems offer innovative solutions for enhancing the efficiency and adaptability of military communications. The use of cloud technologies and cognitive algorithms contributes to building more flexible and resilient communication and information systems in dynamic operational environments. The architectures and prototypes that he has developed find direct application in electronic warfare systems and tactical radio communications. His contribution to creating augmented reality visualization

models supports improved situational awareness and operational planning. The analyses of cyber risks in maritime defense and the developed protective measures are of particular importance for increasing the cyber resilience of military infrastructure. The proposals for improving radar systems through SDR platforms create a foundation for developing a new generation of intelligent sensors. His scientific publications are distinguished by their clearly defined applied focus and technological innovativeness. The obtained results meet the contemporary needs of defense and security systems. The overall assessment is that the contributions of Colonel Ivan Ivanov hold strategic significance for the development of modern defense capabilities.

5. Critical remarks about the reviewed works

Colonel Eng. Ivan Penchev Ivanov, PhD has achieved significant scientific results in his research practice. However, some of these results remain inadequately visible to the academic community due to limited publicity, primarily because the scope of the research is oriented towards the national defense needs of the Republic of Bulgaria. Despite their specialized focus, there exists a series of unclassified yet fundamentally important scientific achievements. I believe it is imperative to disseminate these results widely through publication in peer-reviewed international journals with a high SJR or Impact Factor.

6. Personal impressions

Although I do not know the candidate personally, the provided scientific materials, such as the autobiography, monograph, and volume of scientific publications, provide sufficient grounds to draw a well-founded conclusion regarding his professional competence, profound knowledge, and capacity for independent and significant scientific research activities.

7. Conclusion

The candidate Colonel Eng. Ivan Penchev Ivanov, PhD fully meets the requirements stipulated by the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for its implementing, and also satisfies the criteria adopted by the Institute of Defense "Professor Tsvetan Lazarov" for occupation of the academic position "Associate Professor" in the field of higher education 5. Technical Sciences, professional field 5.3 Communication and computer technology (Radio transmitting and receiving technology).

Taking into account the above-mentioned, **I provide my positive evaluation and recommend to the honorable members of the scientific jury, Colonel Eng. Ivan Penchev Ivanov, PhD to be elected and take the academic position "Associate Professor" at the Institute of Defense "Professor Tsvetan Lazarov" in the field of higher education 5. Technical Sciences, professional field 5.3 Communication and computer technology.**

June 17, 2025

Member of the Jury
(Professor Eng. Petar Boyanov, PhD)