

# **OPINION**

**of a dissertation  
for the acquisition of the educational and scientific degree "Doctor" in**

**Field of higher education – 5. Technical Sciences**

**Professional field – 5.3 “Communication and Computer Engineering”**

**Doctoral program – "Communication Networks and Systems"**

**Author: Eng. Teodora Valentinova Zhorova**

**Topic: Traffic Monitoring in Communication Systems with Artificial Intelligence**

**Member of the scientific jury: Prof. Krasen Kirov Angelov, PhD**

## **1. Topic and relevance of the dissertation work**

The research in the dissertation work is specifically focused in the context of searching for opportunities for functional upgrading of QoS and QoE services through the integration of AI-based tools, applications and models in the planning and operation of communication networks and ICT network infrastructures.

The topic of the dissertation work is fully presented, being developed in four main chapters, which sequentially examine the current state and technical aspects and approaches for intelligent analysis in assessing the quality of the transmission medium, the process of creating models with the application of artificial neural networks and neural-fuzzy classifiers for identifying disturbances in the transmission medium and their research and analysis of effectiveness, the implementation of experimental models for predictive analysis of the performance of the transmission medium in simulated ICT-based systems.

Based on the analysis performed and its correspondence with the formulated goal and main tasks in the dissertation, I believe that the doctoral student has delved deeply into the topic of the dissertation and the theses developed by her are relevant and challenging for scientific and applied development.

## **2. Research methodology**

The dissertation has a total volume of 193 pages. Its content includes a list of abbreviations used, an introduction, four chapters with conclusions drawn after each chapter, a conclusion, contributions of the dissertation work, a list of publications on the dissertation work and a bibliography of the literary sources used. 161 literary sources are cited.

The doctoral student has formulated as the main goal of the dissertation the development of a methodology, reliable simulation models and hybrid analytical modules for intelligent analysis and assessment of Quality of service (QoS) and Quality of user experience (QoE). The proposed approach is based on technologies from the field of artificial intelligence, machine and deep learning and is aimed at adaptive monitoring, diagnostics and prediction of disturbances and traffic characteristics in the communication transmission environment. At the same time, the aim is to ensure cybersecurity and information protection in network and communication resources.

The research methodology is aimed at creating analytical modules for clustering, classification and data recognition, as well as at applying optimization algorithms for function

minimization. Regression analysis, diagnostics and modeling based on technologies from the field of artificial intelligence, machine learning and deep learning are also included. In the process of methodological synthesis of the models, mechanisms for assessing effectiveness and verification are integrated, implemented through the use of 17 different mathematical methods and apparatuses.

I believe that the doctoral student has approached adequately the choice of a systematic framework and tools and means that she has applied to solve the research problem by using appropriate and feasible methods for conducting the study in accordance with the goal and objectives of the dissertation.

### **3. Contributions of the dissertation work**

The dissertation work of Eng. Teodora Zhorova is a comprehensive, logically consistent and well-structured scientific product. A reference containing 6 scientific-applied and 3 applied contributions is attached to the dissertation work. In general, I accept the proposed formulations of the contributions in the dissertation work. The contributions are significant and useful through: development and application of methodologies and approaches for implementing various analytical tools and algorithms with artificial intelligence for recognizing and classifying disturbances; development and research are intelligent methods and models, based on artificial intelligence and machine learning, for analyzing, predicting, optimizing and diagnosing communication and network traffic; proven effectiveness of various neural networks, classifiers and optimization algorithms in noise recognition, predicting traffic parameters, managing network resources and identifying normal and attacking traffic in simulated and realistic communication environments.

Based on the above, I believe that the dissertation work contains the claimed contributions related to the enrichment of existing knowledge.

### **4. Publications and citations of publications on the dissertation work**

The validation of the results obtained in the dissertation work is ensured by the 7 scientific publications (4 in Bulgarian and 3 in English) presented from participation in national and international scientific conferences. The content of the publications corresponds to the topic of the dissertation work and largely covers and provides the necessary publicity for the main research and conclusions presented in the dissertation. In addition, it is important to note that 2 of the publications are in editions that are referenced and indexed in world-renowned databases of scientific information Scopus, with 1 of them having an SJR of 0.152.

The analysis of the submitted publications and the attached reference with scientometric data shows that 74 points were obtained for a group of indicators  $\Gamma$ , which significantly exceed the minimum of 30 points according to the minimum national requirements. Of the 7 publications submitted, 1 is single-authored, which covers the additional minimum requirements of TU - Gabrovo (5 publications of which 1 is single-authored).

From the above facts it follows that the candidate meets the minimum national requirements for acquiring the educational and scientific degree "Doctor" under Art. 2b, para. 2, 3 and 5 of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and the minimum quantitative requirements of TU - Gabrovo.

No evidence of citations of publications was attached to the dissertation work, but this is not a requirement for obtaining the ESD "Doctor".

## **5. Authorship of the obtained results**

A sufficient volume of scientific research work has been carried out on the problems of the dissertation work. Active work continues in this area, which is evident from the information sources used.

In compliance with the national regulatory requirements and the internal rules of TU-Gabrovo, a comprehensive check of the submitted publications on the dissertation work and the dissertation manuscript itself has been carried out, and the authorship of the text manuscripts was validated after verification and establishment of the absence of plagiarism.

## **6. Comments, recommendations and remarks on the dissertation work**

I believe that the dissertation work of Eng. Teodora Zhorova and the scientific research work on it have been fully and completely presented and published. The doctoral student has demonstrated the necessary high level of in-depth technical knowledge, research skills, analytical, critical and creative thinking and focus on results in the development of the dissertation work.

Regarding the content of the scientific materials submitted for review on the dissertation work, I could not point out more significant critical remarks. My recommendations are mainly related to the need to supplement the list of abbreviations used in connection with the complex terminology actively introduced from foreign languages, as well as to the application of publicly available and the creation and sharing of own specialized databases for machine learning of such models.

From the point of view of the practical applicability of the dissertation work, it can be recommended in future research and development to expand the application of intelligent models based on machine learning and artificial intelligence, aimed at more precise detection and prevention of anomalies in network traffic. It is also appropriate to focus attention on work on solutions related to new technological trends and innovations in the backbone communication infrastructure and equipment. It will be of great interest for the obtained results to be directed for presentation and publication in international scientific forums and publications, indexed and referenced in global databases.

The above remarks and recommendations do not belittle the obtained results and scientific value of the presented dissertation work and are intended to serve as useful guidelines in the future scientific and research development of the doctoral student and her aspiration to increase her visibility in the scientific world

## **7. Conclusion**

I consider that the presented dissertation meets the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria.

The achieved results give me reason to propose that the educational and scientific degree "Doctor" be acquired by Eng. Teodora Valentinova Zhorova in the field of higher education - 5. Technical Sciences, professional field - 5.3. Communication and Computer Engineering, doctoral program – “Communication Networks and Systems”.

05.05.2026

**Member of the scientific jury:**

/Prof. Krasen Angelov, PhD/