REVIEW

by Dr. Eng. NIKOLAY ATANASOV SHOPOV, Associate Professor at the Department of Electrical Engineering, Electronics and Automation of the Faculty of Engineering,

UNIVERSITY OF FOOD TECHNOLOGY – PLOVDIV

of a dissertation for the award of the educational and scientific degree "Doctor"

in the field of higher education 5. Technical sciences

Professional field 5.3. Communication and computer technology

doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)".

Author: Eng. Ivaylo Detelinov Uzunov

Topic: "Simulation model and final solutions of security systems".

Scientific supervisor: Prof. Dr. Eng. Slavi Yasenov Lyubomirov - Paisiy Hilendarski University

1. General description of the materials presented

By order No. RD-22-534 of 25. 02. 2025 of the Rector of Plovdiv University "Paisiy Hilendarski" (PU), I am appointed as a member of the scientific jury for ensuring a procedure for the defense of a dissertation on the topic "Simulation Model and Final Solutions of Security Systems" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education 5. Technical Sciences

Professional field 5.3. Communication and computer technology

doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)".

The author of the dissertation is Ivaylo Detelinov Uzunov, Mag. Eng. - a full-time doctoral student at the Department of Electronics, Communications and Information Technologies (ECIT) at the Faculty of Physics and Technology with scientific supervisor Prof. Dr. Eng. Slavi Yasenov Lyubomirov - Paisiy Hilendarski University.

The set of materials on paper presented by Eng. Ivaylo Uzunov is in accordance with Art. 36 (1) of the Regulations for the Development of the Academic Staff of the University of Plovdiv, and includes the following documents:

- a request to the Rector of the University of Plovdiv to disclose the procedure for defending a dissertation;
- CV in European format;
- minutes from the department council, related to reporting the readiness to open the procedure and preliminary discussion of the dissertation work;
- dissertation;
- abstract;
- a list of scientific publications on the topic of the dissertation;
- copies of scientific publications;
- declaration of originality and authenticity of the attached documents.

The doctoral student has submitted five publications on the topic of the dissertation.

2. Brief biographical data about the doctoral student

M.Eng. Ivaylo Uzunov completed his secondary education in 2005 at the State Technical University of Bulgaria - Smolyan.

During the period 2013–2016, Eng. Ivaylo Uzunov studied at the Technical College - Smolyan, graduating with a professional bachelor's in computer and communication systems. Eng. Ivaylo Uzunov graduated as an engineer - master in telematics in 2019 at the "Paisiy Hilendarski" University.

I do not know Eng. Ivaylo Detelinov Uzunov personally, but I believe that he is successfully developing in the field of computer and communication technology, constantly improving his knowledge and skills.

3. Relevance of the topic and appropriateness of the set goals and objectives

Currently, cybersecurity is taking an increasingly important place in the modern information society. Information is the most valuable asset that organisations, companies, and individuals have. The loss and/or theft of information (intellectual property, know-how, patents, databases, personal data, and many others) leads to severe losses of various natures. Free and safe access to the Internet and the safety and security of information flow are vital for individuals, organisations, and society. Protecting information in all its forms – electronic and physical – is one of the most critical challenges. Information must be reliably protected from both external and internal attacks.

Given the above, I believe that modelling, simulating, and analysing possible cyberattacks and protecting against them is of paramount importance.

I believe that the problem under consideration is relevant and is related to implementing an integrated approach that includes testing, simulation analysis, implementation of cryptographic models, and monitoring of network systems.

4. Knowing the problem

Doctoral student Eng. Ivaylo Uzunov has cited 143 information and literary sources in Latin. The bibliography includes titles of literary sources from 1996 to the present. The central part of the cited works has been published in the last 10 years. From the list of cited literary sources, it can be concluded that the doctoral student has thoroughly understood the contemporary world situation and development trends of the problems solved in the dissertation work.

Based on the overview presented in Chapter I of the problems related to network security and protection of information resources, as well as ensuring the integrity of information to minimise losses during cyberattacks, I believe that doctoral student Uzunov creatively evaluates the literary material.

5. Research methodology

To achieve the goal of the dissertation, "To investigate the possibilities for implementing a simulation model and final solutions for security systems. On this basis, five tasks have been set to justify approaches for conducting research on network information systems in terms of security, the solution of which leads to achieving the goal.

The chosen methodology corresponds to the goal set in the dissertation and the tasks that lead to its achievement.

6. Characteristics and evaluation of the dissertation work

The dissertation submitted for review has a total volume of 176 pages, including 61 figures, three tables, arranged in an introduction, four chapters, general conclusions, scientific-applied and applied contributions, a list of terms and abbreviations used, and a list of the author's publications. The list of cited literature includes 143 titles. One appendix (3 pages) with program codes is also included. Conclusions are drawn.

The 2-page introduction justifies the relevance of developing new strategies for protection and implementing innovative solutions in a dynamically changing cyber environment.

Chapter I, entitled "LITERATURE REVIEW ON THE TOPIC OF THE DISSERTATION", is 39 pages long. The chapter examines the results of scientific research on the given problem, provides a review and analysis of the algorithms for determining the types of threats in computer networks, leading to new threats and attacks, respectively. The goal and objectives of the dissertation are formulated.

Chapter two, "SIMULATION ANALYSIS AND RESEARCH OF CRYPTOGRAPHIC MODELS IN SECURITY SYSTEMS", is 37 pages long. The primary methods and approaches for encrypting information are studied. An analysis of the principles and tools of modern encryption and data protection solutions has been made. The primary techniques for ensuring information security and the factors affecting the speed of encryption algorithms have been analysed.

In the next chapter, "RESEARCH OF NETWORK INFORMATION SYSTEMS IN RELATION TO SECURITY" (33 pages), the emphasis is on one of the main problems - cybersecurity. The emphasis is on the types of vulnerabilities and vulnerable points in computer systems. Threats are studied, and methods are proposed for checking and eliminating gaps leading to potential unauthorised access by third parties. An algorithm for protecting the computer system from potential threats is presented.

The last chapter, entitled "EXPERIMENTAL RESEARCH" (44 pages), investigates methods for reducing attacks and improving security by checking and removing gaps leading to potential unauthorised access by third parties. Simulation models in an environment are presented. Results from the simulation of attacks on a server, a firewall for filtering attacking traffic, encryption and data decryption to ensure secure information exchange, etc., are presented.

7. Contributions and significance of the development for science and practice

After becoming acquainted with the dissertation work and the applied scientific works of Eng, Uzunov, I believe that the developed ideas and the obtained results have become known to the scientific community in our country through publications and reports presented at conferences.

In the self-assessment of the contributions presented by the doctoral student, 10 items are formulated, which are classified as scientific-applied (5 items) and applied (5 items). I believe that the presented contributions accurately reflect the results obtained by Eng. Eng. Ivaylo Uzunov.

I believe the contributions relate to adapting known methods and algorithms and creating new technologies, software, and models in a relevant field.

8. Assessment of dissertation publications

After a thorough acquaintance with the dissertation work and publications of Eng, Ivaylo Uzunov, I am convinced that the results from the research and development were obtained entirely with his participation. The results obtained in developing the dissertation work are presented in five publications from scientific conferences in the Republic of Bulgaria and Spain. Two of the publications are in Latin, and in all of them Eng. Uzunov is the first author. I did not find a publication indexed in

SCOPUS and WoS. One report is independent, and he is co-authored with the scientific supervisor in the remaining four.

I believe that the doctoral student's publications on the dissertation reflect the main contributions he claims.

9. Personal participation of the doctoral student

After a thorough acquaintance with the dissertation work and publications of M.Eng. Ivaylo Uzunov, I am convinced that the results achieved from the research and development were obtained entirely with his participation.

10. Author's abstract

The submitted abstract is 31 pages long and complies with the requirements for its preparation. It correctly reflects the main results and contributions of the dissertation work.

11. Critical remarks and recommendations

It should be noted that technical errors in the abstract layout are absent in the dissertation work (e.g., in the layout of the contributions).

12. Personal impressions

I do not know M. Eng. Ivaylo Detelinov Uzunov personally. Still, based on the presented biography, I believe that he is successfully developing in the field of computer and communication technology, constantly improving his knowledge and skills.

13. Recommendations for future use of the dissertation contributions and results

I believe the current work should develop towards implementing new practices for monitoring network requests for early detection of vulnerabilities and developing recommendations for updating and protection.

CONCLUSION

After a thorough acquaintance with the dissertation work and publications of Eng, Ivaylo Detelinov Uzunov, I am convinced that the results achieved from the research were obtained entirely with his participation. With the presented work, the doctoral student demonstrates his capabilities for research activity and solving scientific and applied problems.

The dissertation contains scientific-applied and applied results that represent an original contribution to science and meet all the requirements of the Act on the Development of the Academic

Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the relevant Regulations of the Paisii Hilendarski University.

Based on the analysis, I give a positive evaluation of the developed dissertation work, and I consider it reasonable to propose that Eng. Ivaylo Detelinov Uzunov acquired the educational and scientific degree "Doctor" in the scientific field 5. Technical Sciences, professional field 5.3. Communication and Computer Engineering doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activities, etc.)"

22.04.2025 Reviewer: .....

(signature)

/Assoc. Prof. Dr. Eng. Nikolay Shopov/