

OPINION REPORT
on the procedure for obtaining
educational and scientific degree “Doctor”

by

Candidate: Jivko Stefchev Jeliaskov,

Dissertation thesis title: “Smart Contract Platforms“,

Scientific advisor: Assoc. Prof. Hristo Kostadinov, PhD,

Scientific field: 4. Natural Sciences, Mathematics and Informatics,

Professional field: 4.6. Informatics and Computer Science,

Doctoral program: „Informatics“,

Department: Mathematical Foundations of Informatics, Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences (IMI-BAS).

This opinion report has been prepared by **Assoc. Prof. Todorka Gerasimova Alexandrova, PhD, IMI-BAS**, as an internal member of the scientific jury for the current procedure for obtaining educational and scientific degree “Doctor” according to Order № 91/18.11.2025 of the Director of IMI-BAS and decision of the Scientific council (Protocol № 13/14.11.2025).

The review report has been prepared in accordance with the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, the Rules for the conditions and regulations for acquiring scientific degrees and occupying academic positions in the Bulgarian Academy of Sciences and the relevant regulations of IMI-BAS.

1. General description of the dissertation thesis and the presented materials

The dissertation thesis is in English and consists of **135** pages, containing table of contents, an introduction, six chapters, bibliography with **56** entries, lists of figures and tables, and two appendices. The dissertation meets the generally accepted requirements for obtaining the educational and scientific degree “Doctor”.

From the required documents and papers submitted by Jivko Stefchev Jeliaskov, it can be confirmed that he meets the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, the Rules for the conditions and regulations for acquiring scientific degrees and occupying academic positions in the Bulgarian Academy of Sciences and IMI-BAS, as well as the specific requirements for obtaining

the educational and scientific degree "Doctor", given in the Rules for the conditions and regulations for acquiring scientific degrees and occupying academic positions in IMI-BAS.

2. Short CV and personal impressions of the candidate

Jivko Jeliaskov received his Master's Degree in Mathematics - Probabilities and Statistics from the Faculty of Mathematics and Informatics, Sofia University in 1998. In July 2019 he enrolled as a part-time doctoral student at IMI-BAN, doctoral program "Informatics", Department of Mathematical Foundations of Informatics, and in January 2024 he fulfilled the requirements for starting the procedure of his dissertation defense. During the last 28 years he has been working as a software developer and cyber security expert at several large international software companies.

I have known Jivko Jeliaskov personally since his enrollment in the doctoral program in the Department of Mathematical Foundations of Informatics, have attended his presentations and conference talks and have positive impressions of his work on the topics of the dissertation.

3. Analysis of the scientific and applied achievements of the candidate contained in the presented dissertation thesis and the publications for the procedure

Chapter 1 provides an overview of DLT technologies, their key characteristics, types and classifications. Concepts that are used further in the dissertation are explained. The main elements of the functioning of DLT are described and analyzed, as well as how communication security is ensured and how consensus is achieved. Main conclusions are made based on studied literature sources and directions and functionalities that are of importance for the design of the proposed new blockchain systems are formulated. The choice of a blockchain platform and technological means for implementing the system is justified. Characteristics of the various existing platforms are described, and an analysis of how their specificities could address the challenges in different areas is analyzed.

Chapter 2 describes a distributed system for incentivization of scientific research. It is based on EOSIO technology and allows different parties to set specific tasks for other parties to solve and provide incentives in the form of blockchain tokens.

Chapter 3 presents the traditional SDLC area with its key scenarios, process participants, as well as challenges in implementing and updating the software. The challenges are also described in terms of requirements for the new SDLC system, which should innovatively overcome the difficulties associated with typical software update steps. The most essential part,

presented in Chapter 3, is the definition of the innovative SDLC blockchain design and an analysis of how it overcomes the existing classic SDLC challenges.

Chapter 4 describes the architecture of a practical system for generation of provably random numbers and results from building a simple but robust prototype based on the innovative architecture, describing in detail the environment in which it operates: interfaces, smart contracts, modules and agents, communication protocols, etc.

Chapter 5 describes the scientific publications on the dissertation.

The final Chapter 6 describes the main scientific contributions of the dissertation.

The main scientific contributions of the thesis are as follows:

1. An analysis has been carried out of existing solutions for smart contract platforms based on blockchain technology and distributed ledger technologies (DLT).
2. The most popular modern distributed storage technologies have been examined, together with their advantages and weaknesses, when considered as a foundation for a smart contract platform. EOSIO has been selected as the platform for the subsequent applications.
3. A distributed system for incentivizing research and development activity has been described, in which rewards are defined for finding the unique or the best solution to a given problem.
4. A distributed system for managing the lifecycle of enterprise software, using EOSIO technology as a smart contract platform, is described and analyzed.
5. A distributed system has been described for using a set of algorithms for generating verifiably random numbers, built on a smart contract platform based on EOSIO as the underlying blockchain.
6. A prototype running on Vaulta/EOSIO technology for generation of provable random numbers, based on the innovative architecture, has been presented, and the environment in which it operates has been described in detail: interfaces, smart contracts, data models, and communication protocols.
7. The results from the development of the new systems based on smart contract platforms have been summarized, and analyses have been carried out for the different scenarios successfully addressed by the innovative architecture. The advantages have been

demonstrated, particularly in the areas of traceability, security, and the definition of responsibilities.

4. Approbation of the results

The presented dissertation thesis is written based on the contents of the following two scientific publications:

1. **Jeliazkov J.**, Kostadinov H., Using EOSIO Technology for Publicly Verifiable Randomness, *Studies in Computational Intelligence*, Vol. 641, pp. 87 – 96, 2025, **SJR: 0.189**, ISBN: 978-3-031-76785-2.
2. **Jeliazkov J.**, Tsvetkov B., Kostadinov H., Decentralized Research Incentivization System, *Studies in Computational Intelligence*, Vol. 641, pp. 97 – 103, 2025, **SJR: 0.189** ISBN: 978-3-031-76785-2.

Both publications are co-authored with the supervisor of the doctoral student, one of them is also co-authored with B. Tsvetkov. I assume that the candidate's contribution to the joint publications is equivalent. The obtained results have been presented at two international conferences. In the presented materials on the current procedure no information has been provided on citations of the candidate's publications. There is no plagiarism proven in the legally established order in the presented dissertation work and the scientific papers used in this procedure.

As a result, the candidate Jivko Jeliazkov **covers and exceeds** the minimum national requirements under Art. 2b, Para. 2 and 3 of the ADAS in the Republic of Bulgaria required for the acquisition of the educational and scientific degree "Doctor" in Professional field 4.6. Informatics and Computer Science.

5. Qualities of the abstract

The abstract of the dissertation thesis consists of 40 pages in Bulgarian language. It reflects correctly the contents, results and contributions of the dissertation. The main scientific contributions of the dissertation are correctly and accurately presented in the summary.

6. Critical comments and recommendations

I have no significant critical comments and recommendations. Some mistakes can be found in the submitted documents, which however does not change my positive impression of the obtained results. For example the abstract of the dissertation lacks table of contents and pages numbering; in one of the publications related to the dissertation the second author is missing.

7. Conclusion

Having become acquainted with the dissertation thesis presented in the procedure and the accompanying scientific papers, and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, **I give my positive evaluation and do confirm** that the dissertation presented and the scientific publications to it, as well as the quality and originality of the results and achievements presented in them, meet the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulations for its Implementation, the Rules for the conditions and regulations for acquiring scientific degrees and occupying academic positions in the Bulgarian Academy of Sciences and the relevant regulations of IMI-BAS for acquisition by the candidate of the educational and scientific degree “Doctor” in the Scientific field 4. Natural Sciences, Mathematics and Informatics, Professional field 4.6 Informatics and Computer Science. In particular, the candidate **meets the minimal national requirements** in the professional field and **no plagiarism** has been detected in the scientific papers submitted for the current procedure.

Based on the above said, I **strongly recommend** to the scientific jury to award Jivko Stefchev Jeliaskov, the educational and scientific degree „Doctor” in the Scientific field 4. Natural Sciences, Mathematics and Informatics, Professional field 4.6 Informatics and Computer Science.

19. 12. 2025

Sofia

Signature:

(Assoc. Prof. Todorka Alexandrova, PhD)