

REVIEW

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

Field of higher education: 5 "Technical Sciences"

Professional field: 5.2 "Electrical Engineering, Electronics and Automation"

Doctoral Program: "Application of the Principles and Methods of Cybernetics in Various Fields of Science"

Author of the dissertation: Maya Stefanova Staykova

Topic of the dissertation: "Information and communication technologies in STEM education"

Reviewer: Assoc. Prof. Dr. Eng. Nikola Georgiev Shakev, Technical University - Sofia, Plovdiv Branch, Faculty of Electronics and Automation

By Order No. 345 of 29.12.2025 of the Director of IICT-BAS Corr. Member, prof. Svetozar Margenov on the basis of Art. 4, para 2 of the Law on the Development of the Academic Staff in the Republic of Bulgaria and by a decision of the Scientific Council of IICT (Minutes No. 10/19.12.2025) in connection with the procedure for acquiring the educational and scientific degree of "Doctor" in the professional field 5.2 "Electrical Engineering, Electronics and Automation", doctoral program "Application of the principles and methods of cybernetics in various fields of science" by Maya Stefanova Staykova with a dissertation on "Information and Communication Technologies in STEM training" I have been appointed as a member of the scientific jury.

1. Relevance of the problem developed in the dissertation in scientific and applied scientific terms.

The PhD student has shown in-depth knowledge of the problems in the field under consideration – namely innovative engineering solutions in the methodological and technological provision of STEM education. This is undoubtedly a topical

topic that can also find wide practical application. Moreover, I believe that the practical application of solutions in the field under consideration has the potential to be a factor or tool for the formation of new educational policies and thus to have their influence or contribution to modern society.

2. Degree of knowledge of the state of the problem and creative interpretation of the literary material.

After getting acquainted with the dissertation, I believe that the PhD student has demonstrated to the necessary extent knowledge of the state of the problem and the literary material. The dissertation examines 126 titles, including scientific publications and Internet sources. She was able to independently and critically analyze and interpret them. This allows her to justify correct conclusions, identify scientific challenges and formulate reasoned theses.

3. Evaluation of the chosen research methodology in the dissertation.

I believe that the topic of the dissertation corresponds to the topic of the doctoral program "Application of the principles and methods of cybernetics in various fields of science". The dissertation is in the volume of 160 pages of text note, as well as additional appendices. The chosen research methodology combines analytical, simulation and practical approaches that allow for a sufficiently complete coverage of the target problems.

4. Brief analytical characteristics of the nature of the dissertation.

In the actual part of the dissertation, algorithmic and programming solutions are presented, mainly implemented on various types of mobile and entertaining robots, which can be useful to students in understanding technical systems, the way they are built and applied. I appreciate the presented solutions and developments from the point of view of the scientific field "technical sciences" and in particular the doctoral program: "Application of the principles and methods of cybernetics in various fields of science". Undoubtedly, the presented solutions and innovations find their application in pedagogy. I do not have the competence to evaluate possible contributions in the field of pedagogy.

5. Contributions of the dissertation

In the dissertation, the PhD student has indicated a total of 10 (ten) author's contributions. In my opinion, some of them could be combined and their number could be reduced. I accept that in the presented form they also reflect the results obtained in the dissertation. Contributions are not classified by the PhD student by category. I define the presented contributions as scientifically applied and applied. As contributions numbered 4, 7 and 10 have the character of scientific applications.

6. Assessment of the publications of the dissertation

The number of publications on the dissertation presented by Maya Staykova is 9 (nine). All of them are on the topic of the dissertation. Eight of the publications are in publications indexed by Scopus. One of the publications is independent, and in four of the publications the PhD student is the first co-author. The publications reflect the essence of the work on the dissertation and confirm the required degree of independence of the author.

The scientific value of the presented publications on the dissertation is also confirmed by the available citations from other authors. A check in the Scopus database found 4 citations from publications indexed in Scopus (two citations for publications [5] and [7] each). A google scholar check found 3 more citations (one each for publications [2], [5] and [7]). The indicated interest from other authors confirms the relevance of the proposed research.

7. Abstract

The presented two versions of the abstract (in Bulgarian and English) correspond to the requirements for its preparation. I believe that they adequately reflect the main points and contributions of the dissertation.

8. Conclusion

I believe that the prepared dissertation for the acquisition of the educational and scientific degree of "Doctor" by Maya Stefanova Staykova complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, and the Regulations for its implementation, and the

Regulations for the specific conditions in IICT-BAS. Based on the analysis, I give a positive assessment of the developed dissertation and consider it justified to propose to the esteemed scientific jury to award Maya Stefanova Staykova the educational and scientific degree "Doctor" in the professional field: 5.2 "Electrical Engineering, Electronics and Automation", doctoral program "Application of the principles and methods of cybernetics in various fields of science".

Date: 03.03.2026

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