OPINION

in the dissertation for the acquisition of 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"

Author of the dissertation: Master of Eng. Maya Stefanova Staykova, PhD student at the Institute of Information and Communication Technologies.

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

The dissertation is devoted to a current problem concerning the application of information and communication technologies in STEM education. The dissertation consists of 186 pages, of which the main content is 146, includes 109 figures, 7 tables, 2 appendices, the bibliography covers 126 sources, of which 126 are in English and 6 are websites.

The dissertation student knows well the state of the problem. The speed with which technology is developing fails to synchronize with the educational system in Bulgaria. The given bibliographic reference includes scientific publications, the main part of which is commented on in the review.

The dissertation includes an introduction, three chapters and a conclusion.
The introduction outlines the topic, object and subject of the dissertation. The topicality of the topic is described. A goal has been set for the research work and tasks through which it will be achieved.

Chapter One contains theoretical concepts, an overview, analysis and systematization of STEM education to date in Bulgaria and around the world is made.

Chapter Two examines information and communication technologies in relation to STEM education. Robotics as part of IICT.

Chapter Three explores different robots, whether they are suitable for a learning environment, what opportunities they provide, developing lessons, source codes for relevant robots. Analysis of how suitable they are for integration into curricula through STEM lessons. Specific research tasks are given, which have been tested or conducted in order to analyze and verify the tasks of the dissertation.
The conclusion also gives specific job offers.

From the contributions to the dissertation resulting from the solution of the tasks set, I would highlight four scientific and applied contributions of significant importance, namely:

1) Developed an algorithm for Ozobot EVO for moving the robot along a star-shaped trajectory, without crossing lines, and an algorithm for performing rhythms from Bulgarian folklore.
2) Developed algorithm for the ArtieMax robot for an integrated STEM lesson in technology, mathematics and English.
3) Developed a new model for measuring the distance to objects using a 3D camera. By integrating new hardware and software components, the system adds new functionalities to the proposed program related to analysis in three-dimensional space.
4) An innovative history lesson has been developed based on the streamit platform, allowing a remote visit to a museum through a robotic guide "Robco"

Recommendations and notes:

1) In my opinion, it would be more appropriate if the dissertation student adopted only one version of the presentation of terminological expressions and abbreviations in the text, and not to alternate Bulgarian and English ones. This would probably make the exposure more concise.

CONCLUSION

After my acquaintance with the presented by Mag. Eng. Staykova's dissertation on the topic **"Information and Communication Technologies in STEM Education"** and an analysis of the degree of knowledge of the dissertation of the state of the problem, its relevance, the chosen research methodology and the significance of the received scientific, applied and applied contributions resulting from the solution of the tasks set, as well as with the presented publications on the dissertation, I find it justified to propose to the esteemed scientific jury to award the educational and scientific degree of "Doctor" in the professional field 5.2 Electrical Engineering, Electronics and automation of **Mag. Eng. Maya Stefanova Staykova**.

Date: 02.03.2026 **Compiled**

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