STATEMENT

by Assoc. Prof. Stefan Savov Biliderov, PhD, Eng.
(academic position, scientific degree, name, surname and surname of the member of the scientific jury)

"GEORGI BENKOVSKI"
BULGARIAN AIR FORCE ACADEMY
(workplace of the member of the scientific jury)

of the thesis of the M.Sc. Eng. Stanislav Yovchev Yovkov
(name, surname and surname of the author of the dissertation work)

on topic: „MULTIFUNCTIONAL LEARNING MOBILE ROBOT PLATFORM",

submitted for the acquisition of the educational and scientific degree "doctor"

in a doctoral program
„Automated system for information processing and control"

field: 5. Technical sciences

professional direction: 5.2 Electrical Engineering, Electronics and Automation

city of Dolna Mitropolia 2024

1. Actuality and significance of the scientific problem being developed

The topic of the dissertation work is aimed at the increasingly popular educational robotics. This allows students to not only learn about the robot and its programming, but also acquire a number of other cognitive skills and learn to work in a team. Thus, the way to the new modern technologies is opened for the trainees and it gives them the ability to solve a number of technical tasks. The benefits to education become apparent after the integration of robotics into curricula.

A number of fundamental problems of educational robotics are also affected when solving the tasks arising in the compilation of algorithms for navigation and localization of robots, as well as in their programming.

Educational mobile robotics is already part of a number of educational programs in universities and colleges, secondary technical schools, as well as in various specialized courses and trainings. Training students in a number of fields, such as robotics, automation, artificial intelligence, and software and hardware development will give the presented work relevance and relevance for a long time to come.

2. Evaluation of the scientific results and contributions of the dissertation work

In the dissertation work presented for defense, educational mobile robotics is considered as an object through various; hardware and software mechanical structures and assemblies; control and navigation systems; communication and learning, as well as different methods for designing mobile robots.

On this basis, the goal of the work was set, namely creation and research of algorithms and control systems for learning robots. This is due to the fact that a number of increased and sometimes contradictory requirements are placed on educational robots, such as autonomy and remote control, as well as the ability to: overcome obstacles; tracking a road line; exiting a maze; work with a number of

smart sensors; performance of other specific tasks. Last but not least is the lowering of the price of the teaching robots while increasing their technology and functionality.

The dissertation consists of an Introduction, four chapters and a Conclusion. At the end of the work, the contributions, bibliography and other mandatory attributes are given.

In the "Introduction" description of the object of study, the main topics and skills that are included in the educational mobile robotics are given. The main goal of the development and the tasks that need to be completed to reach this goal are shown.

"CHAPTER 1" is based on a literature review, a retrospective of the development of robotics is made, some definitions and classifications are given. The development of educational robotics in recent years has been analyzed and on this basis some forecasts for the state of the educational robot market have been given. The role and benefits of a STEM program in educational robotics are discussed. Different types of robots are analyzed, as well as the tasks that are set before them. A number of examples of robots used in the classroom are given.

In "CHAPTER 2" various algorithms are shown, contributing to the execution of tasks in the autonomous mode of operation of an educational mobile platform. The functional block diagrams of the algorithms are given, as well as the hardware on which they are implemented programmatically. A comparative analysis of the algorithms of the learning mobile robots in the performance of certain tasks was made.

"CHAPTER 3" concerns the issues arising in telecontrol of the robotic learning mobile platforms. Synthesized block diagrams of the control algorithms are shown, as well as those of the hardware used in solving the set tasks. The remote control of the educational mobile platform using the Android application - MIT Aplication Inverter was examined.

The experiments on the set tasks with the obtained results are given in "CHAPTER 4". The problems are discussed and conclusions are drawn from the conducted experiments.

3. Critical notes

Although the work has many positive aspects, it is normal for this type of dissertation to observe some weaknesses as well, such as:

1. The object and subject of the research is not clearly described, and from there the tasks themselves are slightly vague.
2. Chapter one relies too much on historical retrospection and definitions, and the analysis of the problem thus remains obscured.
3. Some errors in the formulas with lack of description are also observed.
4. There are also some spelling mistakes, as well as poor formatting of the text.

I would recommend the colleague to pay more attention to the wording and description of the issue in the future. This would also be useful to him in the preparation of various project proposals. The obtained results are very interesting and the author of this Statement has not found to this moment a literature source that arranges like this the algorithms that are used in different robotic platforms and robots.

4. Conclusion

Despite the indicated weaknesses in the provided dissertation work, dedicated to a universal learning mobile platform, the creation and research of such is a great challenge to the work and perseverance of the doctoral student. Therefore, the aforementioned weaknesses do not detract the achieved results and universality of the proposed algorithms and systems for synthesizing a robotic learning mobile platform.
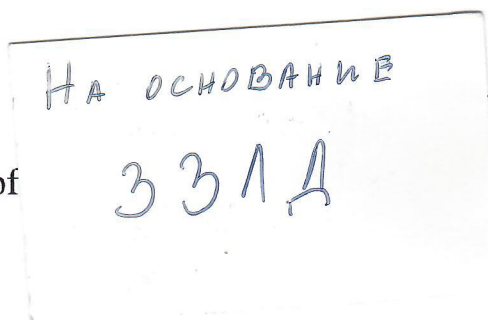
On this basis, I take the liberty of proposing to the esteemed jury to award the Educational and Scientific Degree "Doctor" (a Doctor of Philosophy - PhD) to M.Sc. Eng. Stanislav Yovchev Yovkov.

5. Evaluation of the dissertation work

I give a positive assessment to the dissertation work of M.Sc. Eng. Stanislav Yovchev Yovkov.

Data:11.03.2024

Member of the jury: Assoc. Prof [На основание ЗЗЛД] Eng.