OPINION

on a dissertation for acquiring of educational and scientific degree "doctor" in higher education area 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation in doctoral program "Application of the principles and methods of cybernetics in various fields of science" at the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences

1. Assessment for compliance with the minimum national requirements.

The opinion is prepared by professor eng. Marin Simeonov Marinov, Ph.D., Faculty of "Aviation" of the "Georgi Benkovski" Bulgarian Air Force Academy, Dolna Mitropolia, in his capacity as a member of the scientific jury for the evaluation of a dissertation on topic "Multipurpose tele-operated service robot" with author Eng. Petko Ivanov Stoev. The scientific jury was appointed with order № 32/31.01.2024 of the Director of the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences (IICT-BAS).

In my opinion, the dissertation submitted to me meets the requirements of art. 6, para 2 of the Act on the development of the academic staff in the Republic of Bulgaria (ADASRB) and art. 27 of the the Regulations on its implementation (RIADASRB). This gives me reason to assume that the minimum required 50 points under the group of indicators A for the educational and scientific degree "doctor" defined in RIADASRB.

In the provided to me reference for the compliance with the minimum requirements of IICT for acquiring of educational and scientific degree "doctor", it is correctly reflected in which indicator from the group of indicators D do the dissertation publications fall, as well as what is the contribution of the PhD student in each publication. This gives me the reason to recognize 50 points under group of indicators D, which exceeds the minimum requirements for educational and scientific degree "doctor".

The submitted to me summary of dissertation is 40 pages long, meets the requirements for its formatting and presents the main results obtained in the dissertation.

I am not aware of any written notification of plagiarism or unreliability of the scientific data presented in the dissertation within the meaning of art. 4, para. 11 of the ADASRB.

In accordance with art. 2, para. 1 of RIADASRB, I accept the dissertation and the publications provided to me for assessment.

2. Structure and content of the dissertation.

The dissertation consists of Introduction, 3 chapters, Conclusion, Contributions, Reference list, Declaration of originality, List of dissertation publications. There are 132 figures in the dissertation.

There are 94 sources in the Reference list, including from internet sites. The list of dissertation publications at the end of the dissertation contents 5 publications.

3. Actuality of the problem regarded in the dissertation.

The problem discussed in the dissertation is related to robotics, which has been developing at a rapid pace in recent years. Issues related to the development and implementation of robots in various human activities are laid down in a number of national and international documents. They outline policies for the development of robotics and specify the goals to be achieved.

The goal set in the dissertation is relevant and is associated with the use of robots to assist people in their work activities. Studies of such problems are particularly relevant and are a prerequisite for improving safety, increasing efficiency and addressing important social, economic and environmental challenges.

The modular multifunctional remote controlled service robot developed in the dissertation is applicable in various fields of human activity. It can be easily reconfigured, which provides flexibility and efficiency in performing some daily work activities. The use of already developed communication standards allows to achieve a lower price and at the same time to achieve the universality of its control.

What has been stated in this point gives me reason to conclude that the topic and the research in the dissertation are relevant.

4. Degree of knowledge of the problem state.

In the first chapter, an overview of national and international documents regulating policies in the field of the use of robots is made. The features of different service robot systems are discussed. An analysis of these systems has been made and conclusions have been drawn. Attention has also been paid to the peculiarities of interaction between man and machine, which is an important aspect in the modern high-tech society. With the information presented in the first chapter, the PhD student demonstrates a broad knowledge of not only the technical characteristics and features of service robots, but also of the prospects for their implementation and use in human activities.

What has been mentioned above shows that the PhD student is well acquainted with various aspects of the regarded in dissertation problem

5. Correspondence of the goal and tasks with the achieved results in the dissertation.

A clear goal is formulated and the tasks that must be performed to achieve it are defined in the dissertation. An approach is chosen to design the individual modules and systems of the robot using software products. Synchronization is performed between the used computer-aided design products, through which the overall operation of the

designed robot was simulated. The use of such synchronization ensures high reliability of the obtained results.

The chosen approach in the dissertation fully corresponds to the set goal. The obtained results show that all the tasks have been fulfilled, which also achieved the goal set in the dissertation.

6. Scientific, applied and practical contributions of the dissertation.

I accept and positively assess the contributions formulated in the dissertation. I classify the contributions as applied and practical. I define the first four contributions formulated in the dissertation as applied, and the last three as practical.

7. Evaluation of the dissertation publications.

Submitted to me publications consist of 5 papers at international scientific conferences. One of the publications is independent, and 4 are co-authored. Of those in co-authorship, the PhD student is listed first in 2 of them, indicating that Eng. Stoev is a major contributor to these publications. Three of the publications are in English and two are in Bulgarian. Three of the publications are in science editions indexed in Scopus.

The content of the publications and the editions in which they were published guarantee that the research in the dissertation and their results have become widely known in Bulgaria and abroad.

8. Opinion, recommendations and remarks.

The dissertation has been developed in the necessary volume and represents a completed scientific and research work. I have no critical remarks on the substance of the dissertation and the presented results, but I have remarks on the layout and style.

My main remarks on the layout are as follows:

- there are paragraphs where the first line is not indented;
- there are figures whose captions under them is not centred;
- for some figures there is no explanation in the caption (for example, figures 49 and 50).

Regarding the style, I have the following remarks:

- active and passive voice are used in the dissertation;
- the text in the block diagrams and the algorithms in the dissertation are in English, but it is appropriate that it is in Bulgarian;
- for many figures there is no explanation of what is shown (for example, figure 34);
- the review of regulatory documents in the first chapter is unnecessarily large;
- the subject of the dissertation is not fully specified;
- there are figures in the dissertation that are not the author's, and it is proper to indicate the source from which they were taken;
- for some of the module sizes of the robot, there is no justification for how they were obtained or selected.

Some grammatical errors were also made in the dissertation.

These remarks are not of the essence of the work and do not diminish the value of the contributions in the dissertation.

My recommendations to the PhD student are as follows:

- To pay more attention to the layout, because it creates the first impression of the scientific work and can lead to the rejection or poor evaluation of a very good scientific work in content.
- To use passive voice in his future publications.

CONCLUSION

I positively assess the work done and the results obtained in the dissertation. The dissertation sufficiently meets the requirements of the ADASRB, the Regulations on its implementation, as well as the Regulations for the specific conditions for acquiring scientific degrees and holding academic positions at the IICT. I propose to the respected Scientific Jury to award the M.Sc. Eng. Petko Ivanov Stoev the educational and scientific degree "doctor" in higher education area 5. Technical Sciences, professional field 5.2. Electrical Engineering, Electronics and Automation in doctoral program "Application of the principles and methods of cybernetics in various fields of science".

На основание
ЗЗЛД

10.03.2024 г. Prepared the opinion: .
Pro