

OPINION

on a dissertation to acquire the educational and scientific degree "Doctor"

Author of the dissertation:

assist. M.Sc. Eng. Vasil Georgiev Cvetkov

Dissertation topic:

Increasing the cognitive abilities of robots by optimizing their sensory system

Professional field:

5.2 Electrical engineering, electronics and automation

Scientific specialty:

Application of the principles and methods of cybernetics in various fields of science

Member of the Scientific Jury:

Prof. PhD Eng. Stiliyan Nikolov Nikolov FME in TU-Sofia

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

With the development of artificial intelligence and machine learning, robots are acquiring cognitive abilities, expanding their ability to perceive, understand and interact with their environment. The sensory systems used in robots are the basis of their cognitive abilities. Considering this, I believe that the topic of the dissertation is extremely relevant.

2. Degree of knowledge of the state of the problem and literature

The PhD student is very familiar with the problems in the field of dissertation work and creatively uses them in his work. This is evident from the literature review, which includes 96 literary sources, the majority of which were published in the last 15 years.

3. Correspondence of the chosen research methodology and the set goal and tasks of the dissertation work with the achieved contribution

Based on a thorough analysis of the problem, based on a thorough study of the current state, the doctoral student, Assist. Eng. Vasil Tsvetkov, has correctly formulated the goal of his dissertation. To achieve the set goal, four tasks have been defined that meet the goal and are sufficient for its implementation. I believe that the tools used fully correspond to the goal of the dissertation work and are suitable for solving the tasks set before the doctoral student.

4. Contribution of the dissertation work

The contributions received in the dissertation work have a scientific-applied and applied nature. They are related to the creation of a methodology for designing a sensor system and obtaining confirmatory facts from its use. The contributions can be grouped as follows:

- Scientific-applied – 3;
- Applied contributions – 4.

The contributions correctly reflect what was done in the dissertation work and are important for science and practice in the field of increasing the cognitive abilities of robots.

5. Assessment of dissertation publications

Three publications are presented on the topic of the dissertation. One of them is indexed in Scopus. The doctoral student has a major contribution (50%) in one of them and is a co-author in the other two.

The publications contain key points from the dissertation, which have received a sufficiently wide presentation to specialists dealing with the problems considered in the dissertation.

I am not aware of any results from the dissertation being cited in our country or abroad.

6. Opinions, recommendations and notes

In the dissertation work I did not find any fundamental errors and incorrect use of other people's works. I have the following notes and recommendations:

1. The text contains a mix of the styles of citing literary sources (p. 84, p. 100, etc.)
2. The text contains cited figures that are not available (p. 85 and p. 86)
3. I believe that in the second applied contributions it is not necessary to list the created modules and it can be reformulated as follows - Six optimal sensor modules have been created, integrated into the sensor system of the robot

CONCLUSION

The dissertation work of Assist. Eng. Vasil Tsvetkov is complete, well-formed and sufficient in volume. It treats a current problem and is the personal work of the doctoral student. Sufficient scientific-applied and applied contributions have been received. The main results of the dissertation have been published.

My assessment of the dissertation work is **positive**.

Taking into account the above, I believe that the dissertation work presented to me meets all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, and I propose to the scientific jury, appointed by order No.112/25.11.2024 of the Director of the Institute of Robotics at the Bulgarian Academy of Sciences, **to award Assist. Eng. Vasil Tsvetkov the educational and scientific degree "doctor" in the professional field 5.2 Electrical Engineering, Electronics and Automation, scientific specialty Application of the principles and methods of cybernetics in various fields of science.**

Date: 17.01.2025

MEMBER OF THE JURY:

/Prof. PhD Stiliyan Nikolov/