



Opinion

on a dissertation for the award
of the educational and scientific degree "Doctor"

Author of the dissertation: Svetoslav Emilov Kremenski

Topic of the dissertation: Integration of brain-machine interface and social robots with application in various object domains

Doctoral program: Application of the principles and methods of cybernetics in various fields of science

Professional field: 5.2. Electrical engineering, electronics and automation

Reviewer: Prof. Daniela Ivanova Borissova, D.Sc. – IICT-BAS

According to order No. 60/03.06.2026 of the Director of IR-BAS, I have been appointed to be a member of the scientific jury, and according to the minutes of the first meeting, I have been selected to prepare a statement. For this purpose, I have received all the documents submitted by the doctoral student in accordance with the procedure.

1. Relevance of the dissertation research

The research presented in the dissertation examines an interesting and current topic: the integration of a brain-computer interface (BCI) with social robots. The topic of the dissertation aligns with current trends in the development of robotics, artificial intelligence, and cybernetic systems. The integration of BCI with social robots opens up wide opportunities for application in healthcare, rehabilitation systems, assistive technologies, education, the service industry, marketing, and neuromarketing. In recent years, systems for interaction between humans and intelligent machines have been evolving at an extremely high pace, and the integration of BCI with social robots is a prerequisite for creating a new generation of intelligent systems that can understand, interpret, and adaptively respond to the human condition in real time. All this justifies the relevance of the dissertation research.

2. Analytical characteristics of the dissertation work

The dissertation has a total volume of 177 pages and is structured as follows: introduction, four chapters, conclusion, scientific and applied scientific contributions, list of publications, and sources. On page 31, the goal of the dissertation is also presented, formulated as "to develop and validate a universal methodology for integrating various brain-machine interface devices and social robots in IoT, to be tested in the field of neuromarketing", and 4 tasks for its implementation.

The structure of the dissertation is logically consistent and well-organized. The presentation follows a clear scientific line – from analysis of the existing state of the problem, through the development of original architectural and algorithmic solutions, to their experimental validation.

3. Compliance of the chosen research methodology with the set goal and objectives of the dissertation work

The methodology used, based on analysis, synthesis, comparison, generalization, and experimental research, is appropriately chosen and contributes to achieving the set goal and the formulated tasks in the dissertation.

4. Contributions of the doctoral student

The results of the dissertation research represent an original contribution in the field of brain-machine interface integration and social robots. The main achievements of the dissertation can be classified as scientific-applied contributions that enrich the field with new knowledge. I accept the indicated contributions as real, significant, and sufficient for a dissertation work for the acquisition of the educational and scientific degree "doctor".

5. Assessment of publications

The main results of the dissertation work are presented in 3 scientific publications. One of the publications is indexed in IEEE and Scopus, and the other in WoS and is in an edition with an IF (Q4 = 0.17). The submitted publication is in press, and since no additional information about its acceptance was presented, it was not taken into account. Regardless of this finding, the total number of points fully satisfies the minimum national requirements for acquiring the educational and scientific degree "doctor". The presence of citations is an additional indicator of the scientific significance of the results presented in the work.

6. Abstract and author reference

The submitted abstract in Bulgarian is 54 pages long, and the one in English is 51 pages long. Both versions reflect the content of the dissertation work and are in accordance with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and Regulations for its Implementation, with the exception of the fact that a bibliography of the cited literary sources is not presented.

7. Critical notes and recommendations

According to Art. 27 para. (2) of the Regulations for Implementation the Law on the Development of Academic Staff in the Republic of Bulgaria it is written that "*the dissertation must contain: title page; content, introduction; exposition; conclusion – summary of the results obtained with a declaration of originality; bibliography*". In the presented structure of the dissertation, there is no formal section conclusion – summary of the results obtained, and the bibliography section has been replaced by a section "sources". The indicated notes do not diminish the scientific value of the dissertation, since conclusions are drawn after each chapter and should be considered recommendations for the future development of the research.

8. Conclusion

The dissertation contains original scientific-applied results that contribute to the fields of intelligent systems, robotics, and brain-machine interfaces. The doctoral student demonstrates in-depth theoretical knowledge, good methodological preparation, and the ability to conduct scientific research independently. The presented dissertation work is a completed scientific study on a current and significant scientific-applied topic and is in accordance with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and Regulations for its Implementation, as well as the Regulations for the Specific Conditions for Acquiring Scientific Degrees and for Holding Academic Positions at the IR-BAS. **Based on the above, I give a categorically positive assessment of the reviewed dissertation and propose to the esteemed Scientific Jury to award Svetoslav Emilov Kremenski the educational and scientific degree of "doctor" in the doctoral program "Application of the principles and methods of cybernetics in various fields of science", professional direction 5.2 "Electrical Engineering, Electronics and Automation".**

03 of July 2026

Member of the scientific jury: ..

/Prof. Daniela Borissova, D.Sc./