OPINION

for dissertation work
for the acquisition of the educational and scientific degree "Doctor" in

field of higher education – 5. Technical Sciences
professional field – 5.3. Communication and Computer Engineering
PhD Program – Engineering Automation and Computer Aided Design Systems

Author: MEng Ilian Tsvyatkov Varbov
Title: Modeling and Simulation of Computer System Components
Member of the Scientific Jury: Assoc. Prof. Dr. Eng. Vladimira Krasteva Ganchovska

1. Topic and Relevance of the Dissertation

The dissertation comprises 197 pages. It is structured into an introduction, four chapters, a conclusion, scientific and scientific-applied contributions, a list of publications, a bibliography including 47 references, and two appendices.

The dissertation focuses on the modeling and simulation of fundamental components of computer systems. It describes the development of functional and synthesizable models intended for both educational and analytical purposes, as well as for practical implementation on an FPGA platform.

The modeling and simulation of hardware blocks represent a relevant and significant issue in the field of computer engineering, driven by the need for early error detection, optimization of architectural solutions, and reduction of development time.

2. Research Methodology

The methods, approaches, and algorithms used by the doctoral candidate to address the defined tasks correspond to the stated objective of developing and analyzing models of fundamental computer system components using modern hardware description languages and simulation environments.

Models of arithmetic-logic units, memory modules, multiplexers, counters, registers, and other elements have been developed using various HDL languages. The process of modeling RISC microprocessor architectures using VHDL, Verilog, and TL-Verilog hardware description languages has been examined. The modeling of a microprocessor with an AVR architecture and its implementation on an FPGA platform are also presented. Based on the results obtained from the developed models, conclusions and findings have been formulated for each chapter of the dissertation.

A comprehensive approach has been adopted to achieve the objectives set forth in the dissertation.

3. Contributions of the Dissertation

The doctoral student has presented a total of 6 contributions to the dissertation work defined as scientific and scientifically applied. I accept the wording of the contributions and believe that they meet all the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the relevant regulatory documents of the Technical University-Gabrovo. The contributions reflect the achieved results and are directly related to the set goals and objectives.

4. Publications and citations of publications on the dissertation work

A list of 7 publications is presented, one of which is independent, and in the others he is the first author, which testifies to a thorough scientific preparation and ability for independent research work. One of the publications is in English, and the rest - in Bulgarian.

One of the articles is published in a journal that is refereed and indexed in the world-famous database of scientific information Scopus. The publications correspond to the topic of the dissertation and reflect the results obtained.

With the presented scientific publications and accompanying scientific results, the doctoral student covers the minimum national requirements for group of indicators "Г", according to the ADSRB**.**

5Authorship of the results obtained

I do not personally know the author of the dissertation, but I believe that the materials provided to me for review (dissertation, abstract, publications) testify to the personal contribution of the doctoral student. This is also evidenced by the fact that there is also an independent publication. No plagiarism or borrowing of texts, results and ideas from other authors was found in the works.

6. Opinions, recommendations and remarks on the dissertation

My opinion on the dissertation submitted for review is positive. I believe that the defined tasks have been fulfilled and meet the set goal.

I recommend that the author consider the possibility of developing laboratory exercises on the created models and/or creating an interactive platform for training in computer architectures.

7. Conclusion

The dissertation work of M.Eng. Ilian Tsvyatkov Varbov fully complies with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADSRB), the Regulations for the Implementation of the ADSRB and the relevant Regulations for the Acquisition of Scientific Degrees and Holding Academic Positions at the Technical University of Gabrovo.

Based on the results obtained in the dissertation work, **I give my positive assessment.** ***I propose to the esteemed scientific jury to award the educational and scientific degree "doctor" to M. Eng. Ilian Tsvyatkov Varbov*** in
field of higher education – 5. Technical Sciences
professional field – 5.3. Communication and Computer Engineering
PhD Program – Engineering Automation and Computer Aided Design Systems

04.05.2026

Signature:
/Assoc. Prof. Dr. Eng. Vl. Ganchovska/