

О P I N I O N

by **Prof. Lyubka Atanasova Doukovska, PhD, DSc**
from the Institute of Information and Communication Technologies,
at the Bulgarian Academy of Sciences,
on the Thesis for awarding educational and scientific degree PhD,
under the Scientific Field 5. Technical Sciences,
the Professional Area 5.3. Communication and Computer Techniques,
the Scientific PhD Specialty "Computer Systems and Technologies"

Author of the PhD Thesis: **Ekaterina Antonova Gospodinova - Zaharieva**

PhD Thesis Title: **Concepts for the construction of distributed special
purpose information systems**

This Opinion was prepared on the basis of Order No. 305 from November 28, 2019, by the Rector of the University "Prof. Assen Zlatarov" - Burgas, Prof. Magdalena Mitkova, as well as per Art. 44 of the Rules on the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at the University "Prof. Assen Zlatarov"- Burgas, in connection with a decision of the Faculty Council of the Faculty of Technical Sciences, with protocol No. 47 from November 21, 2019 and report No. 3868 from November 27, 2019 by Assoc. Prof. Yovka Dimcheva Nikolova - Dean of the Faculty of Technical Sciences. In accordance with Order No. 305 from form November 28, 2019, I have been appointed as a member of the Scientific Jury regarding the PhD thesis of the student on self-study **Ekaterina Antonova Gospodinova - Zaharieva** for awarding the educational and scientific degree "Doctor of Philosophy" (PhD), with scientific supervisors Prof. Gani Trendafilov Stamov and Assoc. Prof. Stanislav Denchev Simeonov.

Ekaterina Antonova Gospodinova - Zaharieva was born on January 25, 1971 in Sliven. She completed her secondary education in 1990 at the Western Languages High

School in Sliven. She graduated with a Master's Degree in Electronics and Automation and in Informatics and Information Technology from the Technical University of Sofia, IPF, Sliven, in 1995 and 2006, respectively.

As a member of the Scientific Jury I have received:

1. Order No. 305 form November 28, 2019, by the Rector of the University “Prof. Assen Zlatarov” - Burgas, Prof. Magdalena Mitkova.
2. Dissertation for the educational and scientific degree PhD.
3. Abstract of the dissertation for the educational and scientific degree PhD.
4. Autobiography of Ekaterina Antonova Gospodinova - Zaharieva.
5. Copies of the publications included in the dissertation.

In order to form the final evaluation of the PhD thesis, the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* are implemented the specific requirements in the Act’s Institutional Regulation shall be taken into consideration, where the respective norms are:

1. Pursuant to Art. 6 (3) of the *Development of Academic Staff Act in the Republic of Bulgaria*, PhD thesis should contain scientific or scientific-applied results, which represent an original contribution in science. The PhD thesis must indicate that the candidate has in-depth theoretical knowledge of the relevant specialty and ability for independent research.

2. According to Art. 27 (2) of the specific requirements in the Act’s Institutional Regulation, PhD thesis should be presented in a form and volume corresponding to the specific requirements of the primary unit. The PhD thesis should contain: a cover page; content; introduction; exhibition; conclusion - a summary of the results obtained with a declaration of originality; bibliography.

1. Relevance and importance of the PhD thesis.

The purpose of the dissertation is formulated as follows: “to study methods for building distributed information systems”.

In order to achieve this goal, the following tasks are formulated:

1. To study the main characteristics and analyze the problems in the construction of the distributed information systems and communication standards, and to propose ways to the problems solution;

2. To propose a methodology for designing distributed information systems that allows timely and unimpeded access to information;

3. Design and develop interface and software for connection to network technology platform for automated level measuring system LONWORKS ® following IFSF standard;

4. Develop a program for the practical implementation of an information measurement system as part of an automated light fuel level measuring system for continuous monitoring.

5. Create new calibration tables based on a comprehensive analysis of the errors obtained.

2. Brief information on the PhD thesis.

The PhD thesis consists of 158 pages. Its structure includes a list of abbreviations used, an introduction, four chapters, contributions, a list of nine dissertation publications, a list of seven scientific conferences, used literature from a total of 120 sources and annex.

Chapter one has a volume of 40 pages. It gives an overview of the basic concepts used in the dissertation. Finally, the purpose of the dissertation is formulated, as well as the tasks that must be solved in order to achieve this goal.

The second chapter has a volume of 28 pages. It considers the LONWORKS ® platform built on the LONWORKS ® network protocol. LONWORKS ® is a network platform specifically designed for the needs of industrial and level automation systems management applications. An adapter, platform architecture, connection interface and data exchange protocols are designed and developed. The structure of the IFSF communication protocol has been analyzed. I/O controller and communication software is designed.

Chapter three has a volume of 28 pages. This chapter provides a technical and functional description of the IFSF based software installed on gas stations

Chapter four has a volume of 23 pages. This chapter analyzes the experimentally obtained errors that occur when measuring the levels, which are caused by temperature changes in sensors and fuel, as well as differences in tank structures.

The sources cited are quite diverse and are mainly published by foreign authors.

3. Evaluation of the PhD student's contributions.

The contributions of the PhD thesis are defined as scientific:

1. Modern technologies for automation of systems for remote data acquisitions and its transmission over the Internet, as well as standards for developing communication and data transmission protocols are explored.

2. The modern architecture of the LONWORKS ® network platform and its components are analyzed and conclusions are drawn about their advantages and disadvantages, compared to the already implemented and widespread network platforms. A methodology for the design of distributed information systems is proposed, which allows timely and unimpeded access to information.

3. The European communication standard IFSF, which is still relatively new in Bulgaria, has been investigated. Interface and software for connection to the network technology platform LONWORKS ® have been developed

4. A variant of communication based on the IFSF protocol has been developed. It is designed to meet OSI-compliant requirements and has its own operating protocol. All existing standards have been adopted or adapted.

5. Based on a comprehensive analysis of the errors obtained, new calibration tables are proposed.

The scientific-applied contributions include:

1. Software for gas stations tank level measuring has been developed as per Ordinance No. 4 of the Ministry of Finance and in accordance with Ordinance No. 18. The developed software has been installed and tested at commercial sites. The software supports the IFSF communication standard.

2. Analytical calculations and experimental studies have been carried out and the systematic errors found in real conditions were found greater than the acceptable ones. A measurement uncertainty analysis was performed, on the basis of which instrumental errors were systematized and accuracy calibration tables were prepared.

The contributions thus defined can be found enriching with new knowledge the existing scientific field.

4. Evaluation of publications submitted in the PhD thesis.

The publications on the list of the PhD thesis are nine. Five are in co-authority and four are separate papers. The data presented give me a reason to conclude that the research is self-contained and has been given the necessary publicity among the international scientific community, both at reputable scientific forums abroad and in the country. It is worth noting that two of the publications are not on the topic of the PhD thesis.

5. Evaluation of the PhD thesis abstract.

The PhD thesis abstract is 74 pages long. It reflects in detail the nature and content of the dissertation, including the purpose, subject, object and tasks of the dissertation research and the ways of their realization.

6. Major notes to the doctoral student.

In order to form the final evaluation of the PhD thesis, the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and its Implementation Rules are to be taken into account, in accordance with which I have the following remarks and recommendations:

1. The content of the dissertation does not meet the requirements of Art. 27 (2) of the *Development of Academic Staff Act in the Republic of Bulgaria*. The PhD thesis should contain a conclusion - summary of the obtained results with declaration of originality and end with a bibliography.

2. As a member of the Scientific Jury I have to mention the lack of evidence for the educational component of the PhD degree, such as examination reports, an individual plan, etc.

3. Style and punctuation errors are noted in the text of the dissertation. Inaccuracies are also noted, such as: "My contributions to my dissertation can be divided into scientific and practical ones."

4. The list of the PhD thesis publications is not presented as a correct bibliographic record.

5. Literature sources provided do not qualify for the PhD thesis bibliography.

6. There are no guidelines for future work based on the results of the PhD thesis.

In conclusion, I accept that the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulation are fulfilled. After my introduction to the dissertation thesis and its publications, an analysis of their significance and the contributions they make, I give my positive assessment and I recommend to the Honorable Jury to award the educational and scientific degree PhD to **Ekaterina Antonova Gospodinova - Zaharieva** in the Scientific PhD Specialty "Computer Systems and Technologies".

10.01.2020

Sofia

Signature:

/Prof. Lyubka Doukovska, PhD, DSc/

Подпис заличен
Чл.2 от ЗЗЛД